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ENVIRONMENTAL HEALTH PLANNING GUIDE

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ENVIRONMENTAL HEALTH PLANNING GUIDE

HEALTH AGENCY OPERATIONS
PLANNING AGENCY
AIR POLLUTION CONTROL
HOUSING PROGRAMS
RADIOLOGICAL HEALTH
REFUSE COLLECTION & DISPOSAL
SANITATION PROGRAMS
SEWERAGE SERVICES
WATER SUPPLY SERVICES

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Division of Environmental Engineering & Food Protection
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47

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PREFACE

Health in communities depends, to a large extent, on adequate environmental sanitation. The rapid population growth in urban areas is compelling many communities to realize that plans are needed for correcting current deficiencies and preventing future problems from arising.

Just as an adequate comprehensive community plan must take environmental health factors into consideration, so also must plans for a more healthful environment be judged in the light of overall needs and desires.

This guide is designed to assist in evaluating health related services and facilities from a planning standpoint; its use should provide the community with a better view of the factors contributing to a healthful environment, now and in the future.

Wesley E. Gilbertson, Chief
Division of Environmental Engineering and
Food Protection

ACKNOWLEDGEMENTS

A number of field studies were conducted during the preparation of this evaluation guide. We are grateful for the assistance of the many State and local health, planning, public works and other officials who participated in these field trials during refinement of the manual.

Two ad hoc conferences were also held, during which the participants reviewed and advised on guide objectives and procedures, and assisted materially in formulation of the guide.

The procedures described in the guide have now been applied in several communities and as a result of this field experience some guide sections have been expanded from the previous edition.

Various Branches of the Division of Environmental Engineering & Food Protection, and of other Divisions (Air Pollution, Community Health Services, Radiological Health, Water Supply & Pollution Control) assisted in developing and revising the guide.

Warren F. Smith, Chief
Metropolitan Planning & Development Branch
Division of Environmental Engineering &
Food Protection

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INTRODUCTION

"With the increasing tendency of our people to prefer the urban to the rural life and the consequent centralization of our population, the problem of the city has become a great American question.

The rapid congestion of population in very limited areas presents difficulties, social, moral, economic and political, which demand the most careful attention and press for the wisest solution."

This statement might well have been clipped from today's newspaper, but the truth is that people were reading it over half a century ago in *The American City* Magazine of September 1909.

Today the explosive population growth and the continued concentration of people, production and services in metropolitan areas are making our environmental health problems still more complex and difficult. Over four-fifths of our population growth is concentrated in 212 metropolitan areas and the suburbs are growing six times as fast as the central cities. Cities, towns, and suburbs now blend into an almost continuous "metropolitan area." Polluted water and air, open refuse dumps, substandard housing and overflowing septic tanks are now among the most urgent community problems.

There are no standard answers to a community's problems. The solutions will vary depending on local conditions. This guide, however, presents a systematic approach to a community's environmental health problems by describing the steps and procedures that have been found helpful in determining a community's needs.

The guide emphasizes the evaluation of health-related utilities and services which readily lend themselves to long-range planning, and deals primarily with water, sewerage, refuse, air pollution and housing programs. Health department inspectional services are covered only in the organizational sense, and reference is made to existing rating schedules for several of these vital services.

The procedures described in this guide can be applied to an area as small as a town or as large as a metropolitan area, and are particularly suited for use in a county with several incorporated places and operating agencies.

Planning for the community's environmental health future can be based on study results. Plans should allow a systematic and coordinated approach, in which community economic ability is balanced against the most pressing needs. The survey results may be used to stimulate public interest in the community's health problems and to aid in better coordination of health planning as an important aspect of comprehensive urban planning procedures.

CONSULTATION SERVICES: Within the limits of available consultant personnel, the Public Health Service will provide assistance in the organization of local studies where State and local counterpart personnel are made available.

Ordinarily, such services will consist of (a) orientation in study concepts, (b) explanation of data collection procedures, and (c) assistance in the evaluation and recommendation phases after the data collection is completed.

Requests for consultative service should be directed to U.S. Department of Health, Education, and Welfare Regional Offices (See inside rear cover), through the State Health Department.

CHAPTER I

ORGANIZING THE STUDY

The initiative for organizing a study of environmental health problems, programs, and resources may be taken by any individual, organization or governmental agency in a community.

Invitations to participate in planning and carrying out the study should be extended to:

1. All agencies with responsibilities related to producing a more healthful environment;
2. Interested groups (e.g., civic associations, business associations, service clubs);
3. Persons who have special skills needed in conducting the study or in implementing recommendations that may grow out of the study (e.g., skilled interviewers, writers, opinion leaders);
4. Respected representatives of population groups likely to be affected by the study (e.g., elected officials, interested citizens).

Environmental health is such a broad subject that a single organization usually does not have all of the necessary information or technical specialists.

Various combinations of individuals and groups work together to give effective leadership, depending on problems, resources, and interests. Since studies are not ends in themselves but are intended to stimulate action, participation by key representatives of the public is essential in addition to participation by technical personnel.

Reasons for providing opportunities for this participation by selected persons who have no special training in environmental health are as follows:

1. People have a right to be represented when decisions affecting them will be made;
2. People who are not health specialists often have useful talents not possessed by these specialists;
3. People who play an active role in obtaining facts and making recommendations about environmental health problems are likely to help solve the problems.

The structure of participation may develop in different ways. Some examples follow:

1. A few interested persons may explore ideas in a preliminary fashion, then invite others to join them in planning and carrying out the study;
2. A large group consisting of representatives of all interested organizations may be called together for a general discussion followed by establishment of working committees, and an advisory committee;
3. An already organized coordinating group (e.g., a community council) may take responsibility for conducting the study.

The types of committees, if any, that are set up would depend on the local situation. One arrangement would be to have a separate task force working on each of the sections listed in Chapter II of this guide with representatives of these task forces forming an executive or steering committee. Additional committees may be considered appropriate to provide such services as obtaining financial support, informing the public, providing liaison with certain groups, or conducting training courses for volunteers.

These committees are most likely to be effective if:

1. Chairmen are respected and have skills at leading group discussion;
2. Members have a real desire to study and act on environmental health problems;
3. Objectives and methods are specific and clearly understood by all;
4. Consultants are called in when needed.

Preliminary plans about how to put study recommendations into action should be made

during the organizational phase. The reason for this is that certain steps taken during the study process (e.g., keeping the public informed) may increase the probability of subsequent action.

Advice on methods of helping citizen groups study environmental health problems in a way that is likely to lead to action may be obtained from specialists in public health education, community development, community organization, or adult education.

Besides manpower, other resources that may be needed include money and materials. Some of the materials that are useful are the following: a dozen basic maps, transparent overlays for the maps, and a final report. Federal financial assistance for some aspects of the studies may be available through the Urban Planning Assistance Program of the Housing and Home Finance Agency. The urban planning grants, which generally pay up to two-thirds of the cost of the planning work, are made for the purpose of developing a comprehensive plan for the growth and development of an area. Further information about these grants may be secured from the Housing and Home Finance Agency's Regional Offices located in New York, Philadelphia, Atlanta, Chicago, Fort Worth, San Francisco, and San Juan, Puerto Rico.

The evaluation activities proposed in this guide and the implementation of findings, would in no way supplant programs carried on by various agencies. Instead, agency programs would be supplemented through promotion of a broad coordinated approach to environmental problems.

BASIC STUDY NEEDS

Before undertaking the completion of specific study questions, several maps and charts should be prepared which are applicable to all portions of the survey proceedings. These are:

1. Area map:

One standard map size should be adopted and at least a dozen copies should be obtained. While an existing map can be used, it has been found much easier to prepare a base map showing only the study area boundaries and the outlines and names of the major governmental units in the survey area. Miscellaneous information such as street and highway locations, township or section lines, etc. often confuse the data shown in this study and should be deleted, if possible.

Area maps should be of such a scale as to promote ease of showing data and presenting it at meetings. When the study has reached the report preparation stage, map size can be reduced as needed. A typical area map (reduced size) is shown on page 50.

2. Population Density Maps and Population Data:

Two population density maps will be needed; one showing present densities and the other showing projected future densities. (See pages 52 and 53). This data should be superimposed on two of the area maps and should group densities into four categories as follows:

(Use for maps) *Population Density*	(For information only) *Equivalent Lot Size*
Over 5,000 persons per square mile	Less than ½ acre
2,500 to 5,000 persons per square mile	½ to 1 acre
1,000 to 2,500 persons per square mile	1 to 2 acres
Less than 1,000 persons per square mile	Over 2 acres

In computing population densities, geographic units should be small enough to indicate significant population concentrations. Too large an area may obscure the local population densities and units as small as one square mile are usually desirable. In communities having official planning agencies, the information needed for these maps is usually available or can be readily obtained by the planning group for map preparation.

Where there is no community planning agency and where population data is not available, other data sources should be explored. U.S. Bureau of the Census information can be used for past figures and local Chambers of Commerce often have data on current estimates.

Public utility companies, school board records, real estate groups and similar sources may have useful data for population estimates.

Population forecasting should extend at least 10 years into the future and preferably should also be made for longer periods. Professional guidance is often desirable for making population projections since this is a difficult task. A recommended discussion of the subject is given in *"Population Projections for Local Areas"* by M. Zitter in Public Works, June 1957.

3. Drainage, Soil and Flood Hazard Maps:

A determination is needed of the major drainage basins of the area under study, and it is helpful to have soil characteristics also shown on this map.

Topographic maps for use in preparing drainage maps can be obtained for almost all communities from the U.S. Geological Survey, Washington 25, D.C., if not already available locally. By tracing stream and ridge lines the major drainage basins can be identified.

Soil characteristics provide helpful information where this data is available. For ease of preparation it is usually sufficient to show only three broad classifications; usually permeable and well drained, not usually permeable or not well drained, and poor permeability and drainage. Local offices of the U.S. Department of Agriculture often can supply soil maps which are adaptable for study purposes. A typical reduced size drainage and soil map is shown on page 55.

A desirable adjunct to the general drainage map is a flood hazard map, which is useful in allowing better planning for development of areas subject to periodic flooding.

GOVERNMENTAL BACKGROUND SUMMARY

Name	Form	Activities									
		Health Department	Sewage Collection	Sewage Treatment	Water Supply	Refuse Collection & Disposal	Air Pollution Control	Housing Agency	Zoning	Subdivision Regulations	Planning Agency

If agency is not empowered to carry out the activity use "no". If agency is empowered to carry out the activity but does not, enter a dash. If agency carries out the activity, use "yes".

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Flood hazard maps may be prepared by planning or public works agencies or by consultants in this field. Information and data is available through the Corps of Engineers, the Weather Bureau, or the U.S. Geological Survey. A typical reduced size flood hazard map is shown on page 56.

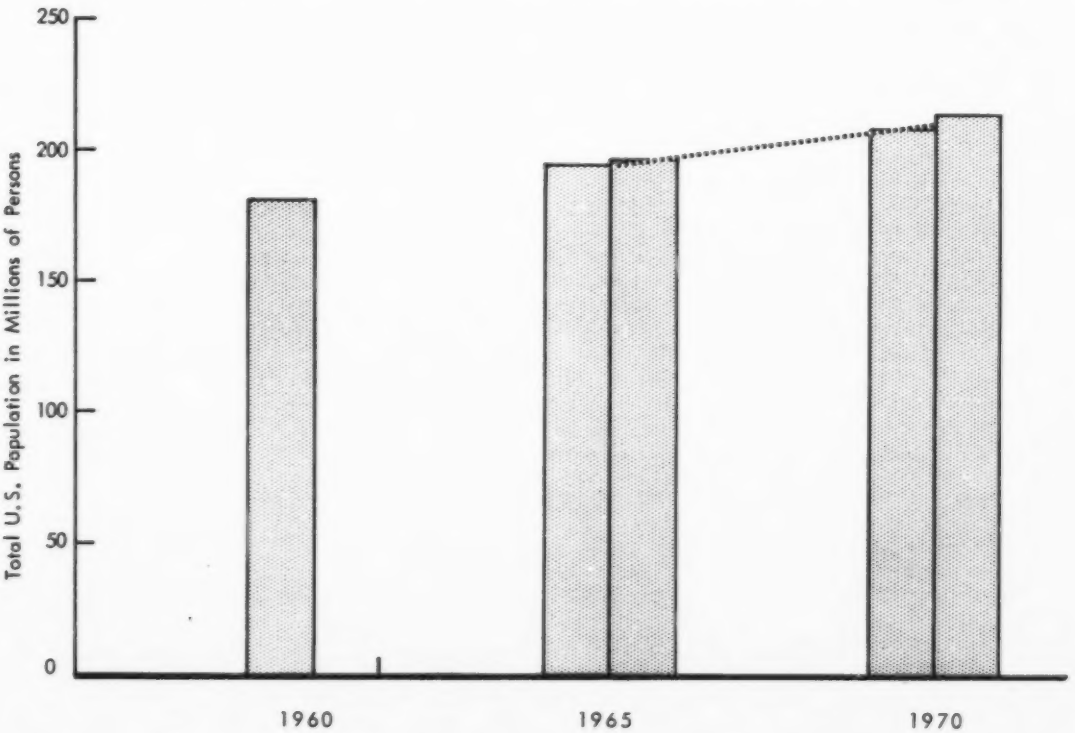
4. Governmental Background:

Information on the type, powers and functions of each governmental and quasi-governmental unit within the study area should be obtained.

If not readily available from local officials, this information can be found in the State Statutes. In preparing the information, charts similar to the one shown may be useful. It should be noted that all statutory powers are not necessarily used, as would be the case where a town chose to purchase water from a private water company or another city instead of operating a municipal plant.

In connection with the gathering of this information, a copy of any ordinances or regulations pertaining to the listed functions will be useful in later considerations and should be obtained for reference.

UNITED STATES POPULATION PROJECTIONS



Source: Bureau of Census Population Estimates, 1962.
Projections are based on 1960 Census counts and on Series II and III assumptions as described in Current Population Reports, Series P-25, No. 187.

CHAPTER II
COLLECTING THE DATA

Having obtained the general basic data, detailed information on programs related to environmental health can be undertaken. The information needed to evaluate the various services and operations is asked for in a series of forms under each subject. One set of forms should be filled out for each agency carrying out a particular function in the study area. For example, if there are four separate sewerage agencies, data is to be obtained for each one on a separate set of forms.

A. HEALTH AGENCY OPERATIONS

This section is designed to obtain general information on the staffing, financing, organization and certain regulations of the health agency. Sample data reporting forms are shown for each program analyzed. Additional forms are available through the Regional Offices shown on the inside rear cover or they may be reproduced without permission. The program data forms are followed by suggested summary charts for ease in subsequent evaluation. Following the summary charts, evaluation guides are given under each subject heading. These guides are based on the experience of local, state and Public Health Service sanitary engineers and sanitarians and also from published and unpublished research material. They are necessarily broad and should be considered as goals of good practice.

After the data has been collected and summarized, the evaluation guides may be used in determining how well the local situations meets these criteria. Any deficiencies which appear should be noted as preliminary conclusions of the study and will be given further consideration later.

1. Health Department (Name)

_____

2. Area covered _____ Population served _____

3. Staff:

	Number	Monthly Salary Range
Sanitary Engineers	_____	_____
Sanitarians	_____	_____

4. Health department annual budget (County, State, etc.) _____

Source of funds _____ Amount _____

_____ _____

Health Department_____

5. Under which conditions is public water required by the Health Department? (Enter check or appropriate figure if item describes conditions; otherwise enter dashes.)

	For Subdivisions	*For Single Homes*
a. In all cases	_____	_____
b. When available within	_____ feet	_____
c. For lot sizes smaller than	_____ acre	_____
d. When wells are unsafe	_____	_____
e. No regulations	_____	_____
f. Other	_____	_____

_____

_____

_____

6. Testing of public water supplies
   a. Agency testing public water supply samples_____
   b. Frequency of sampling_____
   c. If other than local health agency, does Health Department receive copy of test reports?_____
7. Regulation of on-lot water supplies
   a. Are specific regulations in effect?_____
   b. Are they enforced?_____
   c. Are new wells inspected at time of construction?_____
   d. Are private water supply samples tested?_____
      1. On request_____
      2. Routinely_____
   e. Total number of private water supplies_____
   f. Number of new supplies installed annually_____
8. Is refuse storage regulated?_____
9. Are enclosed trucks required?_____
10. Refuse disposal (Any open disposal site not covered with earth daily is considered an open dump)
    a. Are there any private or public open dumps in the area?_____
    b. Is there a regulation prohibiting open dumps?_____
    c. Does the health department inspect the disposal facilities?_____

Health Department _____

11. Under which conditions are public sewers required by the Health Department? (Enter check or appropriate figure if item describes condition; otherwise enter dashes.)

	For New Subdivisions	*For Single Homes*
a. In all areas	_____	_____
b. Where available within	_____ feet	_____
c. For lot sizes smaller than	_____ acre	_____
d. When septic tanks will not work	_____	_____
e. No regulations	_____	_____
f. Other	_____	_____

_____

_____

12. Are privately-owned interim sewage treatment plants permitted? _____

a. Are they correlated with a master sewerage plan? _____

How? _____

_____

_____

b. Who is responsible for their maintenance? _____

_____

_____

c. Has maintenance been generally satisfactory? _____

_____

d. What assurance does the Health Department have of adequate maintenance? _____

_____

_____

13. Regulation of individual disposal systems (septic tanks, seepage pits or other):

a. What agency passed the regulations? _____

b. Are percolation tests required? _____

Performed by: 1. Above agency _____

2. Registered engineer _____

3. Individual _____

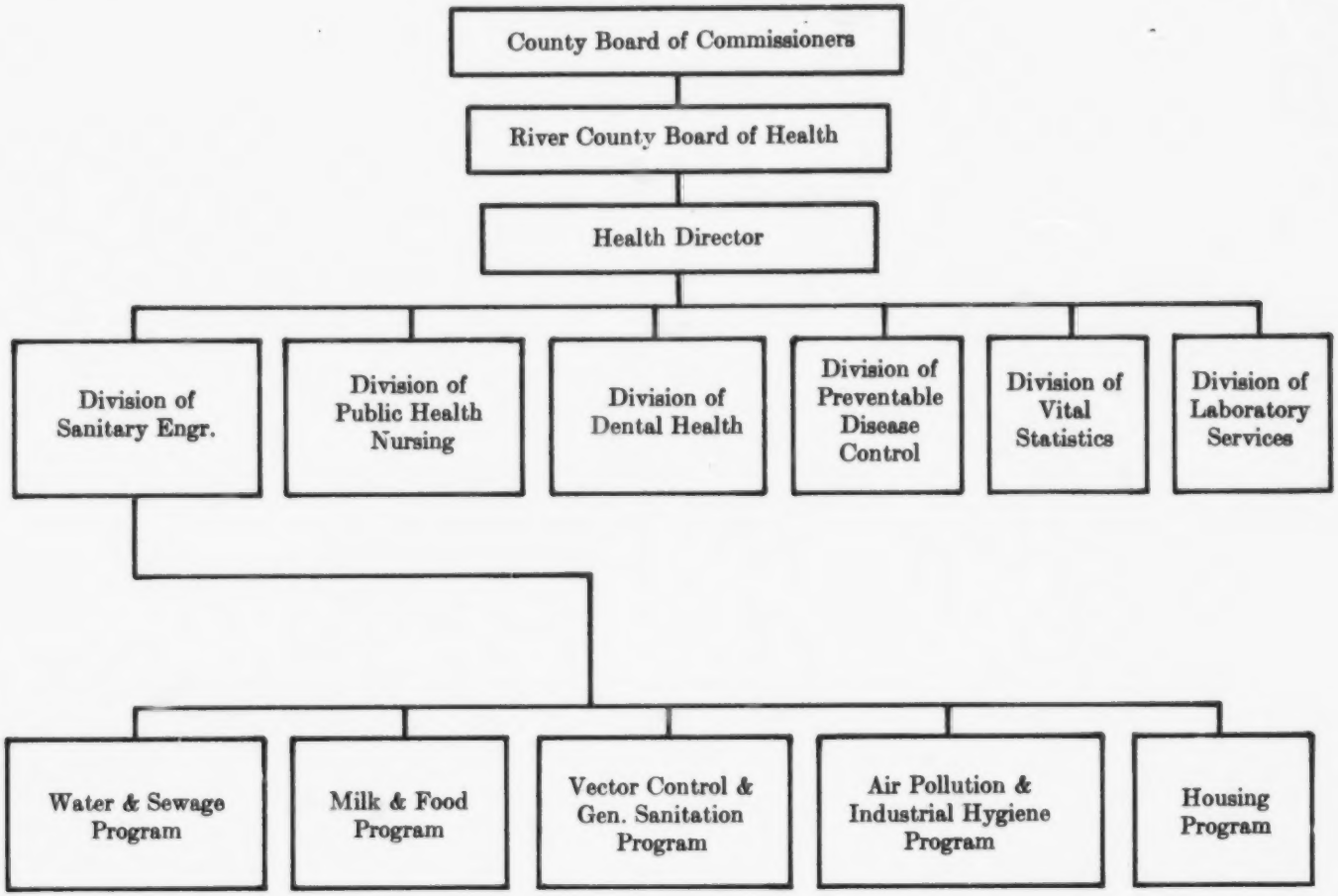
c. Are soil maps used? _____

d. Are deep soil tests used? _____

e. Average annual number of septic tank complaints _____

f. Total number of septic tanks in use (approx.) _____

∞ 14. Show local health department organization in chart form. See example below.


County Board of Commissioners
River County Board of Health
Health Director
Division of Sanitary Engr.
Division of Public Health Nursing
Division of Dental Health
Division of Preventable Disease Control
Division of Vital Statistics
Division of Laboratory Services
Water & Sewage Program
Milk & Food Program
Vector Control & Gen. Sanitation Program
Air Pollution & Industrial Hygiene Program
Housing Program

HEALTH AGENCY OPERATIONS SUMMARY

Name of Health Agency	STAFF					BUDGET	
	Sanitary Engineers		Sanitarians		Number of People Served Per Staff Member	Total Dollars	Dollars Per Capita
	Number	Monthly Salary Range	Number	Monthly Salary Range			

HEALTH AGENCY OPERATIONS—EVALUATION GUIDES

HEALTH AGENCY

All parts of the study area should be served by a local health department. Local (municipal or county) health units are usually able to offer more day-to-day attention to local needs than is possible when environmental health services are provided by the State. In general, one large health department can perform more specialized functions than a multiplicity of smaller ones. In any case, all health departments should be large enough to support a full-time professionally trained staff. Economically, therefore, the minimum population of the health jurisdiction should not be less than 35,000 and preferably 50,000 or more.

STAFFING

According to one study made in 1953, an adequate staffing arrangement for modern sanitation program needs should provide at least one sanitary engineer or sanitarian for each 15,000 persons in the health jurisdiction. However, new areas of responsibility (such as increased emphasis on radiological health) and other changing needs may result in different local needs for staffing purposes. (Source: *Organization and Staffing for Full-Time Local Health Services*, December 31, 1953, PHS Publication No. 441)

SALARY

In 1958, the median annual salary for sanitary engineers in communities over 50,000 was $7,313; for sanitarians, it was $5,044. (Source: *Salaries of Local Public Health Workers*, August 1958, PHS Publication No. 656) According to the National Science Foundation's *Scientific Manpower Bulletin, July 1961*, the median 1960 salary for all reporting sanitary engineers was $9,000, and the median for those sanitary engineers employed by State, local, and other governments was $8,000 per year. No comparable figures are available for the sanitarian category.

It was concluded in *Organization and Staffing for Local Health Services*, January 1, 1958, PHS Publication No. 682, that "public health administrators have recognized for some time that the once recommended $1.50 per capita for providing basic minimum local health services is no longer sufficient to operate a public health program. Current estimates vary, but range between $2.00 and $3.00 per person per year".

WATER CONNECTION REQUIREMENTS

There should be requirements for connection to public water service to aid in the orderly planning and financing of water service systems. This is discussed in more detail in subsequent guides under Public Water Supply. The health department may find such regulations useful as a means of eliminating or preventing unsatisfactory private water supply installations in cases where public service is or could be made available.

WATER TESTING

A recommended minimum standard suitable for local areas is given in *Public Health Service Drinking Water Standards.*

ON-LOT WATER SUPPLIES

Regulations should be in effect which establish minimum construction standards for private water supplies. Standards should meet State and Public Health Service recommendations. (See *Individual Water Supply Systems*, PHS Publication No. 24.) They should require at least an initial quality sample. The licensing of well drillers is recommended as a means of regulating well construction in the community. Although routine inspection and sampling may be so time consuming as not to be warranted in some areas, the practice is encouraged where possible.

REFUSE ORDINANCES

Regulations or ordinances controlling refuse collection and disposal should be adopted throughout the study area. Suggested ordinances suitable for adoption by local health agencies are given in *"Refuse Collection and Disposal for the Small Community"* a joint study and report of the U.S. Department of

Health, Education, and Welfare, Public Health Service, and the American Public Works Association.

REFUSE STORAGE

Standards for the storage and removal of refuse from individual premises should be enforced by the health department. These standards should include requirements for removal of refuse to prevent nuisance conditions. They should also specify the construction, size, and covering for refuse containers.

REFUSE COLLECTION

Enclosed trucks should be required by the health department to prevent nuisance conditions caused by blowing and scattering of truck contents. The licensing of refuse haulers is recommended to assure the use of proper equipment.

REFUSE DISPOSAL

The use of open dumps should be prohibited by health department regulation. Routine inspection of disposal sites is recommended to assure that proper disposal practices are being used.

SEWER CONNECTION REQUIREMENTS

To bring about the connection of residences with public sewerage systems where such systems are or could be made available, the health department should have regulations governing the conditions under which public sewer connection is mandatory.

INTERIM SEWAGE TREATMENT PLANTS

The health agency should have a definite policy regarding the use of interim sewage treatment plants, These plants are sometimes used to provide service during transitional periods before an area's population density warrants connection to a central treatment facility. Use of interim plants should be based on assurance of continuity in providing adequate maintenance. This can be accomplished by having a local governmental entity assume responsibility for maintenance, by public utility commission licensing of the operation with a service charge arrangement, or by use of a performance bond, with plant operation by a private concern.

The sewer system for such plants should be correlated with the master sewerage plan for the area. This allows eventual integration of the sewer system into a future arterial system with the assurance that sizes, slopes, etc. will conform to later needs without additional expense.

ON-LOT SEWAGE DISPOSAL

1. *Enforcement Agency.* A local enforcement agency should be responsible for regulating on-lot sewage disposal. Separate agencies operating in the same region often have different regulations, with the result that builders and homeowners have no uniform policy for guidance.

2. *Percolation Tests.* Soil percolation tests are recommended as a means of evaluating the ability of the soil to absorb the wastes. Except for areas where soil conditions are known from experience to be totally unsatisfactory for this purpose, regulations should call for such a test.

Testing should be done by trained, unbiased persons and a recommended testing procedure (see *Manual of Septic-Tank Practice*, PHS Publication No. 526) should be followed, as "short cuts" often lead to erroneous results.

3. *Soil Maps.* The use of accurate soil maps is suggested to evaluate soil conditions as an adjunct to the more precise percolation tests. Use can also be made of soil maps to determine the general soil characteristics in an area. These maps are available for most areas from the local soil conservation office of the U.S. Department of Agriculture or from the U.S. Geological Survey.

4. *Deep Soil Tests.* A deep soil test is needed to determine subsurface characteristics, and such a test should be part of the local regulations. Proper septic tank performance cannot be expected if interference is encountered from a high water table (within 4 feet of the ground surface) or from rock or

other impervious strata within 4 feet of the trench bottom.

5. *Septic Tank Failure Rate.* An indication of the septic tank failure rate may be obtained by determining the number of septic tank complaints per year as compared to the total number of septic tank installations. The complaint rate is usually much lower than the actual number of cases where septic tanks do not function properly. A complaint rate of 1 percent or more usually indicates fairly widespread failures.

HOUSING

Many local agencies have responsibilities in connection with bringing about and maintaining healthful housing conditions.

Health departments should see that any conditions contributing to unhealthful housing are recognized so appropriate corrective and preventive steps may be taken. Several guides are available to describe housing needs, including the APHA publication, *Basic Principles of Healthful Housing*, and a number of manuals prepared by the Housing and Home Finance Agency, Washington, D.C.

AIR POLLUTION

It is generally desirable that the responsibility for community air pollution activities be lodged in one of the departments of the local government. Where the responsibility is unassigned, local health departments are encouraged to assume this responsibility, at least in the initial stages. One of the first things to be done in air pollution is to study and assess the situation locally so as to determine what steps or means are needed to combat any problems. Technical assistance can usually be obtained in an initial study and assessment from State Health Departments or from the Public Health Service on request.

B. PLANNING AGENCY OPERATIONS

This section is designed to point out the number and jurisdiction of planning agencies in the study area, not to evaluate the scope or effectiveness of planning operations except as they relate to environmental health factors.

1. Name of planning agency (use one sheet for each agency) _____

2. Who appoints the board? _____

3. Area of jurisdiction (also show on map—see page 51 for example) _____

4. Area covered by zoning standards (also show on map) _____

5. Have flood hazard areas been determined and mapped? _____ If so, have flood-plain zoning standards been adopted? _____

6. Have subdivision regulations been adopted? _____
   If so, who approved sanitary facilities? (Enter check if applicable; otherwise enter dashes.)

	On-lot Systems	*Public Systems*	*Mandatory Approval**
a. Health Department			
b. Public Works Dept.			

7. Do health officials consult with the planning agency routinely? _____

8. Were limitations in establishing residential area lot sizes required by the method of supplying water and disposing sewage in:

   a. The master plan _____

   b. The present zoning _____

*If the health and public works department's approval is required by law before the planning agency can approve the plat, check under mandatory approval. In some cases referral to the health department is required, but a plat can be recorded regardless of whether the health department reports favorably or unfavorably on it. This is not mandatory approval.

PLANNING AGENCY

Any growing community should be actively engaged in planning for future land use, including the preparation of a comprehensive plan. Effective planning usually requires qualified, full-time planning personnel. However, smaller communities may find that the services of special planning consultants are more suitable than a continuing governmental agency. The planning should be coordinated either by having a single planning agency for the area or by cooperation among planning agencies in the area.

COOPERATION OF PLANNING AND HEALTH AGENCIES

Public health activities can often be benefited by determining future needs and developing possible methods to best anticipate and meet these needs. In doing this, many of the techniques used by planning agencies are equally applicable to health agency use. Comprehensive environmental health plans are valuable to the official planning agency as well as to health officials, since they provide needed factual data for an important segment of the overall community development pattern. Many potential problems can be avoided through cooperation between health and planning agencies and a close association usually results in mutually beneficial results.

SUBDIVISION AND ZONING REGULATIONS

The area and type of soil required for on-lot sewage disposal and on-lot water supply should be a factor in regulating present lot size requirements and in future planning. Subdivision regulations are particularly valuable as a means of assuring the provision of adequate sanitation facilities. Many planning agencies now refer all proposed new subdivision plats to the health department for a review of the adequacy of methods for private water supply and private sewage disposal. While this is very helpful in preventing the acceptance of plats where wells or septic tanks are proposed but are not suitable, some communities have had even more success through the formation of subdivision review committee. By having a joint review of plats with the agencies responsible for public utilities as well as public health, the economic and construction factors can also be considered and more efficient planning of services may be possible.

Zoning standards are also useful to aid in the development of salubrious neighborhoods, to prevent high population densities in areas not supplied with adequate health-related utilities, and to prevent future slum conditions.

COMMUNITY FACILITIES PLAN

A number of environmental health concerns are closely linked with public utilities and related service facilities, which in turn are related to the land-use pattern for planning and the capital improvement program for execution. In the development of land-use plans and capital improvement programs, the health department can provide much assistance. By the same token, the developed plans will serve to guide environmental health planning in conformity with overall community needs and objectives. The health agency, through a comprehensive environmental health plan, can take an active part in helping to formulate the pattern of community development.

LAND USE AND FLOOD PLAIN PLANNING

Open land on the fringe of urban areas is being swallowed up at a fantastic rate, as much as a million acres each year. As land becomes used up, more and more marginal property comes under development and flood hazard maps of the area can serve a vital information purpose. Future home owners, builders, developers, industrialists, and others are put on notice about the flood hazards existing in areas which they may have under consideration. The community itself can enact regulations governing the development and use of these flood plains to minimize both the physical damage and the accompanying serious health

hazards from future floods. Properly regulated flood plains need not be just vacant waste lands but can be put to many uses consistent with the ever present reality that they are subject to flooding. They can be developed for recreational uses as parks and woodlands, and marginal business areas can be used to provide badly needed parking lots close to the main business section. A typical flood hazard map is shown in the Appendix on page 54.

C. AIR POLLUTION

In many cases, the steps involved in recognizing and evaluating an air pollution problem in an area will relate to the recognition of some effect (reduced visibility, damage to vegetation, soiling, or effects on persons or animals); to the assessment of these effects; to the measurement of air pollution concentrations; and to the evaluation of sources through inventories and measurement.

Agency

1. Effects*
   a. Damage to structures_____
   b. Damage to crops_____
   c. Eye, nose or throat irritation_____
   d. Particle fall-out and soiling of clothes, buildings, etc._____
   e. Reduced visibility_____
   f. Odors_____
   g. Other (specify)_____
2. Pollution Emission Sources (Describe type)
   a. Significant industry_____
   b. Community sources_____
   c. Fuel usage_____
   d. Municipal sources_____
   e. Other_____
3. Regulations
   a. Has air pollution legislation been adopted?_____
      If "yes", describe and give date of adoption_____
   b. Have air pollution regulations been established?_____

*Indicate effects as, significant, minor or none.

c. Describe area covered by this agency's regulations and show on base map.

d. Is their an advisory board for air pollution activity?

Duties (technical, legislative, other)

4. Control program

a. Is authorization required for those new installations capable of causing air pollution?

b. Are new installations inspected prior to operation?

c. Average number of permits issued monthly denied monthly

d. Have the principal sources of air pollution been determined?

e. Has a long-range air pollution abatement plan been developed?

By whom?

When?

f. Average monthly complaint rate

5. Air pollution sampling and measurement

a. Is an air monitoring program in operation. If so, show location of sampling stations on area map.

b. Does sampling program include particulate matter? Gases?

c. Are laboratory facilities available locally?

6. Zoning for air pollution

Map—Show location of present air pollution sources and industrially zoned areas. (See page 56 for example.)

a. Does zoning include areas for industry of the type likely to produce air pollution?

b. Does zoning separate industrial and residential areas sufficiently to reduce local air pollution nuisance effects?

c. Is meteorological data available which might be used for locating new industrial parks and other industrial areas? If so, from what source(s)?

AIR POLLUTION SUMMARY

AGENCY NAME	
EFFECTS NOTED (Indicate as significant, minor, or none)	
Damage to structures	
Damage to crops	
Eye, nose and throat irritation	
Particle fallout and property soiling	
Reduced viability	
Odors	
Other	
Regulations established	
Authorization required for new installations	
Monthly complaint rate	
Long range plan	
Sampling program conducted	

AIR POLLUTION EVALUATION GUIDES

1. EFFECTS

The effects of air pollution should be carefully assessed. A table outlining types of pollution, effects, sources, possible control measures, and air pollution sampling methods is shown on page 19.

2. POLLUTION EMISSION SOURCES

Careful consideration of the relative magnitudes of various pollution emissions will be helpful in relating emissions to the effects noted above, and will also thereby be helpful in deciding upon the needed direction for regulations and control activities.

3. REGULATIONS

Depending on the severity or types of air pollution present in a community, air pollution regulations should be tailored and established to meet appropriate needs. The pattern of regulations can vary all the way from the long-established smoke and particulate matter regulations to the types which have been developed more recently to combat specific problems.

As an early step in arriving at proposed regulations and in developing community backing for the control program, an air pollution advisory committee should be established. Such a committee usually consists of representatives from the public and from the various groups who have special interests in air pollution; membership on the committee may also represent various cities or geographic areas in an air pollution control jurisdiction.

4. CONTROL PROGRAM

The investigation and adequate handling of complaints should be a part of any air pollution control program, as a method of obtaining information on the various local air pollution control problems and in order to render service to the public concerning problems which many of the public find personally important. The answering of complaints, however, should never be the predominant or primary activity of the air pollution staff.

There are two basic approaches for controlling air pollution as follows:

1. The permit system including construction requirements.
2. Regulation of emissions based upon emission standards.

The permit system provides a technique under which prior approval of plans for new construction or alterations is required, and approval is given only if the controls to be provided are adequate to meet requirements on the emission of air pollutants.

Prevention is the keynote of air pollution control. The main preventive tool is the review and approval of plans for new installations and for major alterations of existing installations. The registration of air pollution sources, without construction requirements, can serve as a running inventory of sources. The use of any one, or combination, of these approaches can be determined in view of the community's needs.

A second general control feature is the enactment and enforcement of regulations pertaining to the nature and quantity of air pollution emissions. Among other things, such regulations may be based on emission standards, on standards for pollutant concentrations in the ambient air or upon the engineering feasibility of certain controls to obtain certain desired results.

5. AIR POLLUTION SAMPLING AND MEASUREMENT

Short-term, intensive air pollution sampling studies can be very useful in an initial estimation or evaluation of the air pollution problems of a community. In any community such a study should probably be followed by a longer-term continuing surveillance utilizing a limited number of different air pollution measurements which may be pertinent to the air pollution problem of that area. Technical personnel involved in this work may need special training or technical assistance (which can usually be rendered upon request through the State Health Department or through the Public Health Service's Division of Air Pollution).

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AIR POLLUTION EMISSION TABLE

Type of Pollutant	Effect	Source	Possible Control Measures	Air Pollution Sampling Method
Fallout Particulate Matter	Soiling of property, nuisance	Industry, combustion processes, road mix plants, incinerators, etc.	Cyclones, bag filters, electrostatic precipitators, washers, etc.	Dustfall sampling
Suspended Particulate Matter, Smoke	Soiling of property, visibility reduction, nuisance	Industry, combustion processes, road mix plants, incinerators, etc.	Bag filters, electrostatic precipitators, better combustion	1. High Volume Sampling 2. AISI Smoke Sampling 3. Visibility Determinations
Hydrocarbons	Primary contributors to Los Angeles type smog (eye irritation, rubber cracking, visibility reduction, ozone formation).	Automotive vehicles, oil refineries, fuel handling, solvent handling.	Afterburner and other automotive devices (under development), automotive blowby devices, floating roof covers, vapor recovery systems.	Freezeout method
Oxides of Nitrogen		Automotive vehicles, combustion processes, industry	Automotive devices (under research), controlled combustion	Saltzman method
Oxidant (a measure of Los Angeles smog)		Photochemical reactions in the atmosphere	Controls for hydrocarbons and oxides of nitrogen	1. Potassium iodide method 2. Phenolphthalin method
Carbon Monoxide	Toxic pollutant	Automotive vehicles, industry	Afterburners for industry; automotive exhaust devices (under development)	A modification of the NBS colorimetric detector tube technique
Sulfur Dioxide	Corrosive, odorous plant damage, toxic	Combustion processes, industry, etc.	Absorption towers, control of sulfur content in fuel	West method
Pollen	Allergy, hay fever	Natural—trees, grasses, weeds, etc.	Farming methods, weed control	Collection on slides
Odors	Nuisance	Industry and miscellaneous	Good housekeeping, chemical control, masking, counteractant, etc.	Trained nose

6. ZONING FOR AIR POLLUTION

Development of a sound, long-range program of prevention and/or correction is greatly aided by good zoning regulations. Correlation of meteorological data, present and future industrial growth patterns, and community expansion characteristics is desirable in relating air pollution control with community planning and zoning.

A strong effort should be made to separate industrial areas from residential areas or to minimize the extent of their abutting boundaries, so as to curtail the occurrences of local type nuisances of the direct industry to residence type.

D. HOUSING

This section is to determine the efficiency of housing services and programs within the study area. A more detailed evaluation of housing conditions and programs is described in "The ACTION Urban Renewal Evaluator" available from the American Council to Improve Our Neighborhoods, 2 West 46th Street, New York 36, New York.

Agency _____

1. Have the following regulations been enacted? (Yes or no)

Regulation or Code		*Agency Responsible*	*Area of Jurisdiction (Show on map—see p. 57 for example)*
Housing*	_____	_____	_____
Building	_____	_____	_____
Plumbing & heating	_____	_____	_____
Electrical	_____	_____	_____
Zoning	_____	_____	_____
Rooming house	_____	_____	_____

2. Which of the following services or programs are provided?

   a. Housing code enforcement?

      (1) On complaints only _____

      (2) On a selected area basis _____

      (3) On both _____

   b. Systematic evaluation of housing and neighborhood quality? _____

      What evaluation method is used? _____

   c. Community organization or planned education program for housing and neighborhood improvement? _____

      By which agency, committee, or group? _____

   d. Coordination of housing and neighborhood improvement programs? _____

      How? _____

      _____

      _____

* Means housing code similar to APHA Proposed Housing Ordinance and does not include enforcement of sanitary code or other general regulations in residential areas.

Agency _____

e. Review of plans for conversions (creation of new dwelling units within existing dwellings? _____

By which agency? _____

f. Home accident prevention program? _____

By which agency? _____

g. Other special services or programs for control of housing quality? _____

_____

_____

_____

_____

_____

3. Housing quality.* (Show location of sub-standard areas on map. See page 57 for example.)

a. Number of residential structures? _____

b. Number of dwelling units? _____

c. Number of substandard dwelling units? _____

d. Approximate number of new dwelling units constructed per year? _____

4. Urban renewal project(s)

Type of project(s)	Size	
(Clearance, rehabilitation)	Acres	No. of Dwelling Units

5. Is there a public housing authority? _____ If so, how many housing units are provided? _____

*If not available otherwise, information on the number of dwelling units and "dilapidated" dwelling units may be obtained from Bureau of the Census publications, *Census of Housing—Nonform Housing Characteristics* and *Census of Housing—General Characteristics*.

HOUSING SUMMARY

AGENCY NAME	PROGRAM INCLUDES (Enter check; otherwise enter dash)									DWELLING UNITS		
	Housing code enforcement	Accident prevention	Urban renewal	Conversion plan review	Public housing	Building code	Plumbing, heating codes	Electrical code	Zoning	Total number	Estimated number substandard	Constructed annually

HOUSING EVALUATION GUIDES

The housing guides are not designed to evaluate the quality of housing in the area. The guides will assist in revealing any major gaps in the mechanism designed to control housing conditions. Precise measures of quality require detailed study using the APHA appraisal technique or some similar device.

REGULATIONS

The only way to prevent slums is to insure that all of the study area has a comprehensive set of regulations and programs for the control of both new and existing dwellings. Anything less than complete coverage leaves a loophole for the development of slums either in the core city, the suburbs, or on what may now be open land.

There is no ideal structure for a comprehensive housing program, and it usually evolves from experience. Housing, building, plumbing and heating, electrical, and zoning codes are all considered essential. Rooming house, tourist court, trailer court, and nursing home regulations are not essential unless the background data indicate a sizable number in the area.

HOUSING PROGRAMS

Housing programs should utilize a systematic evaluation of housing and neighborhood quality. The APHA Housing Quality Appraisal Technique is perhaps the most widely accepted method, but locally developed methods have been used. The main criterion is that some objective technique is employed on a systematic basis. This will serve to identify the location and nature of deterioration and permit the charting of a quality rating for a neighborhood. (Where housing evaluation studies have been conducted, the location of sub-standard dwelling units on a map is a useful part of the report.) Preventive or remedial action can then be taken at the right time.

Good housing in a good neighborhood is not enough for achieving permanent slum prevention. Programs should be developed to create neighborhood organizations dedicated to housing improvement and maintenance, and should be properly coordinated by some officially designated agency or committee.

A strong program of prevention requires review of all plans for housing conversions or alterations.

In housing rehabilitation there are many opportunities for home accident prevention. This must depend more upon education and technical advice than upon code specifications.

CONSTRUCTION PROJECTS

Many communities are finding that urban renewal projects are worthwhile for certain deteriorated areas. Before entering upon an urban renewal program, evaluation of housing conditions is needed.

Certain groups within the community may require low-cost housing. Where adequate housing facilities for this group are not otherwise available, public housing may be needed.

Some recommendations usually lend themselves to estimates of timing or preliminary cost figures and these may either be included in the basic report or left for later supplementary reports, particularly if lengthy analysis or outside consultant service is needed.

E. RADIOLOGICAL HEALTH

This section is designed to assist in determining the need for radiological health activity in the community by bringing some factors to the attention of the study group.

1. Is there any local program with regard to radiation effects on public health? _____. If so, what agency has this responsibility? _____
2. Is there a State level program for radiological health? _____
3. Are State and local regulatory codes adequate to properly safeguard health? _____
4. Have all radiation sources been located and surveyed? _____ If so, has the community been conditioned to understand these developments through public information? _____
5. Are new radiation sources contemplated? _____. If so, has the community been conditioned to understand these developments through public information? _____
6. Is there an environmental monitoring program? _____. Is surveillance work conducted? _____. Are there adequate radioactive waste disposal criteria? _____
7. What departments of the government are affected? _____. Are all personnel trained? _____. By whom? _____
8. Is there an emergency accident plan? _____. Warning Systems? _____. Special transportation routes designated? _____
9. Has the master plan for community development been updated to include nuclear industry needs? _____

RADIOLOGICAL HEALTH EVALUATION GUIDES

PUBLIC HEALTH POLICY

Ionizing radiation, if properly utilized, is instrumental in improving the health and welfare of the people. Exposure to radiation, however, results in damage which may not be apparent immediately. Therefore, consistent with good medical practice, exposure to radiation from all controllable sources must be minimized. Governmental health departments should be given the legal authority to guard the public against undue exposure. Control of sources of ionizing radiation for the protection of the public against the hazards of radiation exposure is a government function for which official health departments should be given major legal responsibility. It is urgent that Federal, State, and local governments establish health department programs to identify and evaluate human exposures and the radiation sources responsible for them and to develop effective control measures where necessary. The basic public health objectives are to recognize the essential uses of radiation and to reduce, wherever possible, exposures incident to them as well as to preclude unnecessary radiation exposures.

LEGISLATION

Most states now have adopted legislation regarding radiation sources, in the form of registration requirements, comprehensive radiation protection codes, coordinating mechanisms, or advisory groups on atomic energy development. A suggested State Radiation Control Act has been developed for possible adoption.

RADIATION SOURCES

X-Ray

The increasing number of medical, dental, industrial, and research uses of X-ray equipment makes it desirable that standards for health protection be adopted and enforced. Medical and dental uses include diagnostic and therapy units with radiation exposure. Industrial uses include units designed for the determination of defects in castings and welds and for the detection of foreign bodies in packaged foods. Shoe-fitting fluoroscopes may cause unnecessary radiation exposure both to the public and to the operators and the use of this type of radiation device is restricted or banned in many states and local areas.

Radionuclides

The naturally occurring radionuclide most widely used in medicine and industry is Ra^{226}. An important factor to remember when considering the health aspects of naturally occurring radionuclides is that they can be purchased on the open market without formal application or special facilities being required. Industrial uses include radiography, luminous compounds and static eliminators such as sometimes used by textile and paper trades, printing, photographic processing, and telephone and telegraph companies.

Artifically produced radionuclides are produced by the Atomic Energy Commission. In addition to industrial and research uses, an increasing number of physicians are licensed by the Atomic Energy Commission to utilize radionuclides for diagnosis or treatment of illnesses. The preparation, handling and transportation of these radionuclides involve possible exposures, as does the disposal of wastes originating from these materials.

Nuclear Reactor Operations

Sources of radiation exposure associated with nuclear reactor operations include the reactor itself, its ventilation and cooling wastes, and the fission product wastes. Most major colleges and universities now have reactors and some utility company reactors are coming into use.

SURVEILLANCE

The presence of radiocontaminants in the environment may range from one radionuclide in one environmental phase to multiple contaminants in multiple environmental phases.

Evaluation of the overall health significance of such contaminants requires an understanding of the concept of Radioactivity Concentration Guides or "Maximum Permissible Concentrations," and the additive effects of multiple radiation sources.

If the air and water in a particular area contain radioactive materials, it is quite probable that significant contamination will be present in milk and foodstuffs produced in that environment. Because public health officials must be in a position to evaluate the total radiation stress being placed upon man, and to do so they must know all sources of radiation exposure, measurements restricted to any one environmental phase will not be adequate. In fact, such a monitoring procedure could lead to a false sense of security, since the "obvious" hazard is not always the "real" hazard. An effective routine monitoring program is desirable as one part of community radiological health activities.

Should monitoring show local levels to be rising, or at a potential danger point, countermeasures may need to be applied. These may affect the source, the vectors (air, water, milk, food) or the host (population). Before countermeasures can be applied intelligently, the exact sources contributing to the high levels, the geographic area, and the population groups adversely affected must all be identified. This requires a monitoring and laboratory competency far greater than is needed for "routine" surveillance.

TRAINING

Training in the sanitary engineering aspects of nuclear energy is offered by the Public Health Service, along with specialized courses on nuclear energy. A number of colleges and universities are currently offering seminars and short courses, as are some industrial groups, and also the Atomic Energy Commission. Training films for loan are available both from the Atomic Energy Commission and the Public Health Service.

F. REFUSE COLLECTION AND DISPOSAL

1. Area covered by collection system (use one set of sheets for each system) _____

_____

2. Who operates the refuse collection system?

   Name _____

   Address _____

   a. Public agency? _____

   b. Contract collector? _____

   c. Franchised collector? _____

   d. Private scavenger? _____

   e. How many collectors serve the collection area? _____

   f. What agency regulates refuse collectors? _____

3. Map—Show jurisdiction, franchise or service area and location of disposal sites. (See page 58 for example.)

4. Number of homes served _____

5. Percent of homes served _____

6. Has a refuse master plan been developed covering:

   a. Collection _____

   b. Future disposal sites _____

   c. When? _____

   d. By whom? _____

   e. Is it being followed? _____

   f. How often is it up-dated? _____

7. Is there a capital budget for refuse collection and disposal facilities? _____

   (Long-range financial plan) _____

   _____

System _____

8. What criteria govern the extension of services? (Enter check if applicable, otherwise enter dash.)

   a. When public funds are available _____
   b. On petition of homeowners _____
   c. Master plan schedule _____
   d. Request of health department _____
   e. Requires refuse district formation _____
   f. Other _____
   g. Population density _____
      (Describe definite requirements)

_____

_____

_____

9. How often is refuse collected, and what is the charge for this service?

Type of Refuse	*Number of collections per week*	*Rate**
a. Mixed refuse		
b. Garbage		
c. Rubbish		
d. Other (specify)		
_____		
_____		

10. Are enclosed trucks used? _____

11. Is garbage required to be wrapped? _____

12. Are garbage grinders required for newly constructed residences? _____

13. What controls are in effect regarding individual household incinerators? _____

14. Are homeowners required to pay for public service (whether or not service is used)? _____

*Use monthly single-family residence fee. If service is supported by general tax funds, divide expenditure by number of homes served.

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System _____

15. What disposal method is used?

a. Open dump _____

b. Sanitary Landfill _____

c. Incinerator _____ Capacity _____

d. Other _____

_____

_____

_____

16. Who operates the disposal facility? _____

_____

17. What is the distance from the estimated center of population to the disposal site? _____

_____

18. What charges are made for using the facility? _____

_____

REFUSE SUMMARY

Name of Community	Operated by	Number of homes served	Master plan	Capital budget	FINANCED BY		COLLECTION					DISPOSAL		
							Include			Pick ups per week				
					Taxes	Monthly Residential Service Charge	Trash	Garbage	Enclosed trucks	Summer	Winter	Type	Operated by	Distance from Population Center

REFUSE EVALUATION GUIDES

COLLECTION AGENCY

A governmentally regulated system of refuse collection is preferable to the practice of having individual competitive haulers deal directly with the homeowner. This regulation can be achieved by a governmentally operated system, by having private companies contract with the local government, or by having private companies franchised by the local government.

REFUSE MASTER PLAN

A master plan based on a thorough engineering analysis for the collection and disposal of refuse is vital in rapidly growing communities. The alternative is almost insurmountable future problems. Even the best planned refuse collection and disposal system will be one of the costliest services provided by a municipality. A poorly planned system is certain to place a continuous, undue burden on financial resources and create ill-will in the community.

Of prime economic importance is the proper location of disposal facilities in relation to future population concentrations. Sites for these facilities must be designated and acquired either through zoning, leasing, purchase, or condemnation to avoid future hostile public reaction as well as to avoid expensive future acquisition costs.

There must be close coordination of the refuse collection and disposal services (including any necessary transfer stations) and the community transportation plans to develop the most economic hauling system. Coordination with future recreational area plans may be mutually beneficial through improvement of low land by filling with refuse or incinerator residue.

EXTENSION OF SERVICE

A definite policy should be established for extending service areas. In contrast to water and sewerage services which require considerable long-range planning of physical needs, refuse collection lends itself to somewhat more flexible program planning.

COLLECTION

Collection should include both rubbish and garbage. Where only one type of refuse is collected routinely, experience has shown that the other type is often neglected. Closed body trucks are desirable for preventing material from scattering. Compaction trucks are advantageous under some circumstances because of larger capacity per unit volume. If garbage is collected, it should be done at least twice weekly during the warmer summer months. Weekly collection may suffice during winter months in many parts of the country.

Wrapping of garbage has been found to be an effective means of fly control during summer periods. A number of communities now require the installation of garbage grinders in newly constructed residences, and where sewage disposal facilities are capable of treating this load this practice is often desirable. Household incineration of combustible refuse should be carefully regulated to prevent insanitary conditions resulting from the possible introduction of non-combustible material, and to control air pollution. In those densely populated urban areas having adequate refuse collection, individual burning of refuse often creates serious air pollution problems and under these conditions communities may wish to restrict or prohibit this method of disposal.

RATE STRUCTURE

Refuse service charges throughout the area should be determined. A comparison of service charges in the study area, as related to length of haul, may indicate potential savings through relocation of disposal sites, or rerouting of collection trucks. Cost of service is largely determined by collection time, and every effort

should be made to route the collection services most efficiently in view of changing needs.

All homeowners within the area served by a publicly operated collection system should be required to pay whether they choose to receive the service or not.

DISPOSAL FACILITIES

Because of nuisance conditions and health hazards, open dumps are not acceptable. Other disposal methods such as the sanitary landfill or incinerator are satisfactory when properly operated. The disposal site should be as near as possible to the area it serves, preferably not more than 10 miles away.

DISPOSAL COSTS

Operating costs for sanitary landfills currently range from $1.00 to $1.50 per ton of refuse. Incinerator costs are considerably higher, but may be offset by shorter haul distances. Cost of incineration usually ranges from $2.00 to $5.00 per ton of refuse. Where charges are made for the use of the disposal facilities, a weight basis is more equitable than a volume basis. Charges should reflect both operating and replacement costs.

AREAS SERVED

In the same manner as previously described in evaluating water and sewerage services, the refuse service area map should be compared with the population density maps to determine coverage in the various density groupings. The chart assumes average topography and reasonable length of haul, and is based on cost research using various numbers of collection stops per mile. As a "rule-of-thumb" guide, they can be used for determining the economic justifications of service under average conditions.

Population Density	*Equivalent Lot Size*	*Service Economic Justification*
Over 2,500 persons/sq. mi.	Less than 1 acre	Service is justified
1,000–2,500 persons/sq. mi.	1 to 2 acres	Service is normally justified
500–1,000 persons/sq. mi.	2 to 4 acres	Service is not normally justified
Less than 500 persons/sq. mi.	Over 4 acres	Service is rarely justified

G. SANITATION SERVICES

No attempt is made to "rate" the services in this category, but a number of sanitation programs are listed primarily to point out any programs which may be duplicated or those which may be lacking in the community.

It is not suggested that every community should necessarily conduct all the programs listed, but their value should be considered in connection with a study of environmental health. Where the community wishes to evaluate the effectiveness of specific programs, special rating methods are available. Examples of these are the Public Health Service compliance rating schedules for milk control programs and for eating and drinking establishment programs.

The American Public Health Association also has prepared evaluation methods for many facets of sanitation and organization of public health operations, the *Evaluation Schedule* and also the *Guide to A Community Health Study*.

A listing such as shown below may be helpful in obtaining a picture of the services offered, and such a list should be prepared for each public health agency operating in the study area.

1. Health Department_____

2. Active Sanitation Programs	Program in Operation (yes or no)	Conducted By:
Accident prevention		
Air pollution		
Camp and park sanitation		
Child care homes		
Eating, drinking establishments		
Food processing plants		
Frozen dairy products		
General sanitation complaints		
Grocery stores		
Hospitals		
Hotels, motels		
Housing		
Ice manufacturing		
Industrial hygiene		
Meat inspection		
Milk inspection		
Mobile home parks		
Nursing homes		
On-lot sewage disposal		
On-lot water supplies		
Plumbing inspection		
Poultry inspection		
Radiological health		
Refuse collection, disposal		
Rodent control		
Schools		
Shellfish inspection		
Swimming pool sanitation		
Vector control		

H. PUBLIC SEWERAGE

One of the most useful results of this section is the preparation of the sewerage service map called for under item 3. While such a map may be available locally, experience has shown that they are often not kept current. Also, maps may be in the form of a number of individual maps, each showing only a part of the study area. Current information should be condensed and superimposed on one of the previously prepared area maps, such as shown in the example on page 59. If lateral and submain locations are not shown on available maps, the boundaries of the overall service area should be approximated.

1. Name of system (use one set of sheets for each system) _____

_____

2. What agency operates the system? _____

3. Map—show jurisdiction or "franchise area," service area, location of plants, outfalls, pumping stations.

4. Number of homes served _____

5. Percent (homes served/all homes in area) _____

6. Has a sewerage "master plan" been developed? _____

   a. When? _____

   b. By whom? _____

   c. Is it being followed? _____

   d. How often is it up-dated? _____

7. Is there a capital budget (long-range spending plan) for major nonrecurring improvements to sewer facilities?

_____

8. Is the sewerage system planned for expansion? _____

   How? _____

9. Under what conditions are homes required to connect to existing sewer lines? (Enter check if applicable, otherwise enter dash)

	For New Subdivisions	*For Single Homes*
a. In all cases	_____	_____
b. Where available within	_____	_____
c. No regulations	_____	_____
d. Other	_____	_____

_____

_____

System _____

10. What criteria govern the extension of lines? (Enter check if applicable, otherwise enter dash)

	Within Corporate Limits	*Outside Corporate Limits*
a. When public funds are available		
b. On petition of homeowners		
c. Master plan schedule		
d. Request of health department		
e. Requires sewer district formation		
f. Other		
g. Population density (Describe definite requirements)		

_____

_____

_____

11. Who pays for sewer line extensions across vacant areas?

a. Agency responsible for the public sewerage system _____

_____

b. Developer _____

c. Shared _____

(Describe any special rebate methods)

_____

_____

_____

12. Who pays for lines larger than those needed for current use:

a. Agency responsible for the public sewerage system _____

b. Developer _____

c. Shared _____

(Describe any special rebate methods)

_____

_____

_____

System _____

(Items 13 through 17 need not be completed by agencies not operating their own treatment plant.)

13. Design capacity of treatment plant (in m.g.d.) _____

14. Treatment

    a. Primary _____

    b. Secondary _____

15. a. Immediate receiving water _____

    b. Drainage basin _____

16. Does any sewage other than storm water bypass flow directly into the receiving water without treatment? _____

    _____

17. Describe any action taken by a state agency against the system because it was polluting a receiving stream. _____

    _____

    _____

    _____

    _____

18. Itemize the residential rate structure (for obtaining service originally and for continuing use).

    _____

    _____

    _____

    _____

    _____

    _____

    _____

    _____

    _____

    _____

PUBLIC SEWERAGE SUMMARY

NAME OF SEWERAGE AGENCY	OPERATED BY	Number of Homes Served	Master Plan	Capital Budget	Designed for Expansion	TREATMENT			
						Primary	Secondary	Capacity m.g.d.	Receiving Water

PUBLIC SEWERAGE EVALUATION GUIDES

SERVICE AREA

Service areas should be based on population density and topography. A multiplicity of small sewage treatment plants indicates a lack of coordinated area planning. The practice of constructing many small plants, each designed to serve only its immediate area, is less desirable and often more expensive than a few large plants designed to serve entire drainage areas. A comparison of the service area map with the map previously prepared for drainage and soil conditions will be helpful in determining (a) most logical locations of treatment facilities and service areas, and (b) areas where public sewerage is most needed due to soil conditions which preclude the proper operations of private septic tank systems.

JURISDICTIONAL AREA

Jurisdictional areas should be related to drainage areas and should reflect anticipated growth patterns.

SEWERAGE MASTER PLAN

A sewerage master plan showing future needs and facilities is necessary in attacking the problem of urban growth. In areas currently without serious problems, such a plan will assist greatly in preventing future problems. Along with the master plan, a capital budget (long-range financial plan) is needed, in which expenditures are allocated for periods of several years. Both the master plan and the capital budget should be related to other community needs.

EXPANSION NEEDS

A sewerage system which allows flexibilty to meet changing conditions is desirable. This can be accomplished by designing sewer sizes to handle both present and future needs, and by a treatment plant which will allow expansion at minimum expense. Where economics do not justify large sewer main construction in all areas, temporary pumping stations have been used until population densities warrant permanent trunk line installations.

SEWER CONNECTION REQUIREMENTS

When public facilities are available, connection to such a system should be required, since this allows better system planning. A determination is needed for availability, and a definite distance should be set. Some areas also use a time factor, allowing one to two years before connection is required. Still another system is that of requiring payment of a front foot benefit charge where a line is available regardless of whether connection is made.

SEWER LINE EXTENSIONS

The community should have a definite policy for determining the method by which service extensions are made. Whatever method is used, it should allow extensions to be made where economic and health factors make this desirable.

The policy should include provision for extension of lines across vacant lots. This requires a decision as to the method of payment or cost sharing. For over-sized lines designed to serve a large drainage area, a common method is for the government agency to pay the difference in cost between a sewer sized only for the immediate development area and the larger size which will be needed ultimately for the total drainage area.

ADEQUACY OF TREATMENT

The community should provide treatment for all sewage. In urban areas, the discharge of untreated sewage into the environment constitutes a definite health hazard. If such conditions exist, or if the present facilities do not provide treatment of all sewage, steps should be taken toward corrective measures for the community.

RATE STRUCTURE

A determination of total sewerage service costs is useful to compare local system costs with each other and with costs in adjacent areas. Average monthly residential sewerage cost is a convenient basis for this com-

parison. In some communities sewerage costs are paid from a general fund supported by ad valorem taxes and in this case, an estimate of average monthly residential cost should be made.

In other areas sewerage costs are based on water usage. If this is the case, a standard water consumption figure must be assumed and used throughout the study area for comparison purposes. One thousand cubic feet per residence per month (about 75 gallons per person per day) is suggested for this purpose.

AREAS SERVED

To make the following evaluations the sewerage service map is compared with (1) the present population density map, to determine current service needs and (2) the future population density map, to determine these areas which the future will find most in need of sewerage service. In this connection, there is considerable evidence that, within limits, the construction of new sewer systems to serve anticipated growth areas is often "self-insuring"; that is, the presence of adequate public sewerage facilities attracts home builders and home owners alike to the areas so served and in this way stimulates population growth in these areas. By computing the area provided with sewerage service as a percentage of the total area in each density grouping, the percentage of homes served for each of the population groupings may be determined.

Example:

49.6 sq. mi.—total in study area

7.9 sq. mi.—total area in "over 5,000 persons per sq. mi." density group

6.8 sq. mi.—of this 7.9 sq. mi. served by public sewerage service

Therefore: $100 \times \frac{6.8}{7.9} = 86$ per cent of this density group is served

The following chart relates the economic justification of public sewerage service with various population densities. The chart does not necessarily reflect the justification of public sewerage service from a health standpoint, since this cannot be determined except as a judgment factor.

With this limitation, the chart should serve as a "rule-of-thumb" guide for planning purposes. Local characteristics such as topography and subsoil conditions may alter the criteria, which are based on research results for average soil and topographic conditions.

Population Density	*Equivalent Lot Size*	*Service Economic Justification*
Over 5,000 persons/sq. mi.	Less than ½ acre	Public sewerage is justified
2,500–5,000 persons/sq. mi.	½ to 1 acre	Public sewerage is normally justified
1,000–2,500 persons/sq. mi.	1 to 2 acres	Public sewerage is not normally justified
Less than 1,000 persons/sq. mi.	Over 2 acres	Public sewerage is rarely justified

I. PUBLIC WATER

Data for preparing the map under item 3 can be obtained from the water supply agency or from the records of privately operated utility companies. In some cases, it may be necessary to obtain information from the State Public Utility Commission for this item and for items 11 and 12. (As with the maps for sewerage systems, condensation of data may be necessary to show the information on one base map.)

1. Name of system (use one set of sheets for each system) _____

   _____

2. What agency operates the system? _____

3. Map—Show jurisdiction or "franchise area" service area, location of plants, source, and pumping stations. (See page 60 for example.)

4. Number of homes served _____

5. Percent of homes served _____

6. Has a water "master plan" been developed? _____

   a. When? _____

   b. By whom? _____

   c. Is it being followed? _____

   d. How often is it up-dated? _____

7. Is there a capital budget (long-range financial plan) for water facilities? _____

   _____

8. Is the water system planned for expansion? _____

   How? _____

   _____

9. Under what condition are homes required to connect to existing water lines? (Enter check if applicable, otherwise enter dash)

	For New Subdivisions	*For Single Homes*
a. In all cases	_____	_____
b. Where available within	_____	_____
c. No regulations	_____	_____
d. Other	_____	_____

_____

_____

_____

System _____

10. What criteria govern the extension of lines? (Enter check if applicable, otherwise enter dash)

	Within Corporate Limits	*Outside Corporate Limits*
a. When public funds are available		
b. On petition of homeowners		
c. Master plan schedule		
d. Request of health department		
e. Requires water district formation		
f. Other		
g. Population density (Describe definite requirements)		

11. Who pays for water line extensions across vacant areas?

a. Agency responsible for the public water system _____

b. Developer _____

c. Shared _____

(Describe any special rebate methods)

12. Who pays for lines larger than those needed for current use: (Do not include lines built only for improving pressure or for fireflow purposes)

a. Agency responsible for the public water system _____

b. Developer _____

c. Shared _____

(Describe any special rebate methods)

13. Source of supply _____

System _____

14. Treatment
    a. Chlorination _____

    b. Other _____

15. Present total reliable source supply (m.g.d. at lowest flow)* _____

16. Present total reliable plant capacity (m.g.d.) _____

17. Present storage capacity (finished water) _____

18. Is there usually adequate pressure (30 lb/psi) in all parts of the system? _____

19. Describe any action taken by a State agency against the system because of the quality or quantity of water.

20. Itemize the rate structure (for obtaining service originally and for continuing use).

21. What is the community fire underwriting rating? NB _____

*Obtainable from U.S. Weather Bureau or Geological Survey. Note any proposed dams which may affect supply. For wells, estimate the safe yield from past experience.

PUBLIC WATER SUMMARY

Name of Water Service Agency	Operated by	Number of Homes Served	Master Plan	Capital Budget	Designed for Expansion	Treatment			Present Total Reliable Source Supply (m.g.d.)	Present Storage Capacity	Adequate Pressure	Monthly Residential Fee	
						Chlorination	Other	Plant Capacity (m.g.d.)				Inside Municipality	Outside Municipality

PUBLIC WATER EVALUATION GUIDES

SERVICE AREAS

A small number of community water utilities is preferable to a multiplicity of uncoordinated systems. Where practical, interconnection between distribution lines is recommended. A large number of relatively small water companies or municipal departments is often the result of a lack of a coordinated policy for community water resources. Widely different rate systems, insufficient capacity in some areas, and deficient fire protection service can often be traced to these conditions and illustrate the need for an area-wide coordinated plan for water service.

WATER MASTER PLAN

A master plan which shows future needs and facilities in relation to the area's growth and water resources is necessary for effective planning. Such a plan should be developed in connection with a sewerage master plan, and should encompass the long-range watershed needs, storage facilities, and, if appropriate, flood-control plans. Pipe networks, pumping facilities, treated water storage needs, and fire protection demands should also be considered.

Still another factor needed for a good community water program is a long-range financial plan. Both the master plan and capital budget should be related to other community needs.

CONNECTION REQUIREMENTS

Regulations calling for mandatory connection to public water supplies, where public water service is, or could be made available, are recommended for allowing better system planning and financing.

EXTENSION OF SERVICES

The community should have a definite policy for determining the method by which service extensions are made. Where water is provided by a private utility firm, extensions are largely dictated by economic factors. Where the system is publicly operated, there should be clear-cut processes by which the service can be extended without undue "red tape."

Where vacant areas must be crossed, or where the pipe network calls for oversized lines, a policy should be firmly established describing any special financial arrangements for such cases.

WATER QUALITY

The treated water should meet State and Public Health Service quality standards. A recommended minimum standard suitable for States and local areas is given in *Public Health Service Drinking Water Standards*.

WATER QUANTITY

Capacity and storage should be such as to provide quantities adequate for maximum day demands, without significant loss of pressure. The system should also be capable of meeting fire flow demands. In most cities under 200,000 population, the water required for fire fighting purposes, plus the maximum day consumption, is the governing factor in design. Requirements for fire fighting needs are usually based on standards set by the National Board of Fire Underwriters.

RATE STRUCTURE

Although no emperical figure can be provided as a "reasonable" water rate, the cost of water should be fairly consistent throughout the study area and should be reasonable enough to encourage connection to the public supply. In some communities, water revenues are too low to allow sound fiscal planning for depreciation or anticipated expansion needs. In other areas, water rates are set high enough to give a surplus sometimes used for other purposes. A thorough study of the rate structure is desirable to avoid both of the above practices and to provide fiscally sound service rates.

The average monthly residential bill is a convenient means of comparing costs with those in

other areas. For comparative purposes, an assumed quantity of 1,000 cubic feet per family per month is suggested (about 75 gallons per capita per day).

Example:

Charges—first 900 cu. ft. or less per quarter 0.45/100 cu. ft.
Next: 1,200 cu. ft./quarter 0.36/100 cu. ft.
Next: 9,900 cu. ft./quarter 0.30/100 cu. ft.

Cost: 900 @ 0.45/100 =	$4.05
1,200 @ 0.36/100 =	4.32
900 @ 0.30/100 =	2.70
	$11.07

for 3,000 cu. ft. in 3 months or $3.69 for 1,000 ft.^{3} per month.

AREAS SERVED

Public water supply service should be provided to those areas where service can be justified from health and economic standpoints. In making the following evaluation, the water service map should be compared with present and also future population density maps. The percentage of homes served in each population density group can then be determined.

This chart is based on average cost of public vs. private water supplies as compiled from various journals and reports. The policies of State public utility commissions regarding capital investment-financial return were also taken into account.

Local characteristics may indicate an adjustment to these criteria is needed in some cases, but they are suitable for average conditions as a "rule-of-thumb" guide in determining economic justification of public water service.

Population Density	*Equivalent Lot Size*	*Service Economic Justification*
Over 2,500 persons/sq. mi.	Less than 1 acre	Public water supply is justified
1,000–2,500 persons/sq. mi.	1 to 2 acres	Public water supply is normally justified.
500–1,000 persons/sq.mi.	2 to 4 acres	Public water supply is not normally justified.
Less than 500 persons/sq. mi.	Over 4 acres	Public water supply is rarely justified.

CHAPTER III
USING THE DATA

DEVELOPING CONCLUSIONS AND RECOMMENDATIONS

After completing the review and evaluation of data as described in Chapter II, a more critical consideration of the resultant tentative conclusions can now be made.

This step usually consists of two phases; first, condensing, re-wording and summarizing recommendations and second, establishing some system of priority, based on community need, financial capability, and consideration of local factors which might affect the implementation of the recommendations.

In the communities which have applied the guide processes, some typical conclusions included:

(a) suggestions for improved co-ordination between departments (such as health and planning)
(b) the creation of new divisions in the health agency to be responsible for new or unfilled program needs
(c) ordinances or regulations relating to various health and public works services
(d) the creation of various types of sanitary district authorities
(e) extensions for water and sewer services into new areas
(f) new or improved subdivision regulations
(g) State enabling legislation needs
(h) recommendation for such items as frequency of refuse collection

Recommendations for:

(i) better co-ordination or consolidation of city and county health activities
(j) detailed long-range facility planning
(k) detailed engineering or economic studies of special community services beyond the scope of these studies
(l) appointment of new commissions or committees to handle special problems.

While not intended to cover all normal community findings, this list nevertheless gives some indication of the direction taken by some study groups.

Some communities have been successful in obtaining widespread public support by preparing speakers' kits complete with graphic aids, sets of pertinent facts, reasoning used by the study group, conclusions, and answers to most-asked questions.

Volunteer speakers from the study group are then asked to present this material at approximate group meetings throughout the community.

For these recommendations susceptible to public decision, the surest way to guarantee action on a community problem on which fact finding and discussion are completed is to place the issue on the ballot at a general or special election. This procedure might apply to approval of bond issues for public improvements, for changes in governmental forms or jurisdictions, or for creation of certain service districts.

Other recommendations may call for actions susceptible to administrative decision, such as setting up subdivision regulations, passage of a new ordinance or creating an inter-government coordinating committee. Before public discussion is necessary or desirable, the appropriate government officials, appointed or elected, should be informed of the study groups feelings, and the desired action may be obtained without need for further action simply because of the soundness of the proposal and the fact that groups of community stature have discussed and favor it. If public hearings are held, as might be the case for passage of an ordinance, spokesmen from the study group should be prepared to speak in favor of the legislation.

PREPARING THE REPORT

The final study report format will be dependent on the type of study recommendations and the sponsoring agency.

In general, if a citizens group sponsors the studies, the report will be directed to the appropriate governing officials in the area. If one or more departments of government conduct the studies, the report may be directed either to the administrative head of government or to the community as a whole as a means of generating public support.

Regardless of the formal sponsoring group, the Health Department will have a leading role in these studies, since environmental health is the primary responsibility of this agency.

The local Health Officer normally occupies a position of considerable prestige in the community and for this reason as well as because of the need for technical health consultation services, these studies require active participation by the Health Agency. State Department of Health assistance is also desirable, particularly if recommendations involve health operations at the State level of government. Sometimes the State Department of Health may wish to co-sponsor the final report.

Planning agency support is also essential, since report recommendations will often have a bearing on overall community plans and can provide a useful portion of the comprehensive physical planning operations. Public Works departments and other interested agencies should also be brought in on data collection, evaluation and report preparation phases of the studies.

Reports should contain a statement as to the reason for the study, the final recommendations, a summary of the supporting data showing the reasoning behind the recommendations, maps, and charts for illustration of situations difficult to describe, and the necessary action steps. A typical report form is shown on page 48.

When materials and data are being prepared for the report, it should be kept in mind that much of this information will be useful in a form suitable for showing at conferences and discussion meetings. For example, the area map will necessarily be prepared on a large scale (small size) for the report, but the same information should be prepared in a size suitable for group showing, in one or two copies. Many of the individual maps, such as water service and population densities, are more effectively shown by overlays superimposed on the basic area map. Reproduction costs do not usually allow this for reports produced in volume, but such overlays are extremely useful for group showing to council meetings, civic associations, etc.

PUTTING RECOMMENDATIONS INTO ACTION

Unless the study results in recommendations applicable only to internal governmental administration, some degree of citizen support and participation will be needed.

This calls for organized public discussion and can be based on meetings organized by the individual groups making up the main study group. Such meetings should begin by an introduction of the facts and presentation of the analysis by responsible persons. Graphic aids are very helpful here. Participants should have the opportunity to ask questions and discuss the facts, rather than the subject in general.

FOLLOW-UP

After all the above steps are completed and the study has been finished, some method for follow-up and periodic up-dating of plans is necessary. Provision for this has been handled in many ways. For very large communities a permanent citizens' advisory group (sometimes with a full-time director or staff) has been useful in working routinely with planning and other official agencies. Where this expense is not justified or possible, the study group may wish to appoint a continuing follow-up committee for periodic consultation with government agencies and re-activation of the study group if future needs warrant additional studies.

Official planning agencies, where they exist and are adequately staffed, usually constitute the best opportunity for liaison and will be responsible for both short- and long-range planning. Attendance at meetings of the planning commission or arranging for minutes of plan-

ning commission meetings to be furnished may be helpful in keeping up with changing conditions.

Where there is no planning agency, creation of such a unit should be an objective of the study group in most growing communities. However, careful consideration should be given to the most preferable jurisdiction. County or even regional planning may be more advantageous than a planning agency concerned only with problems of a particular municipality.

A regional planning association, even though it may have no specific power or authority, often serves as a useful means of providing informal correlation among its individual members who consist of a representative from each planning agency within the region. Another advantage of a regional association is that it provides a forum for considering broad, long-range goals of an entire area and often can benefit by coordination of regional goals with state planning activities where the state has a planning department.

Regardless of the method used, the interest developed through citizen participation and organization should be maintained and some definite plan should be determined for continued utilization of organized effort for maintaining a balanced, healthful community environment.

APPENDIX

TYPICAL REPORT FORM AND MAPS

SUGGESTED FORMAT FOR ENVIRONMENTAL HEALTH SURVEY REPORT

LETTER OF TRANSMITTAL

This usually will be directed to the Board of Health or to the executive or political leadership of the study area. If the recommendations from the survey cover broad administrative as well as technical items and, therefore, will require action by diverse groups, it may be desirable to omit specific designation and substitute a general preface in place of a letter of transmittal. The latter procedure is also useful where a non-official agency, such as a civic group, conducts the study.

TABLE OF CONTENTS

INTRODUCTION

This should include the reasons for and the objectives of the survey and report. All participating agencies should be recognized in the introduction.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

GENERAL AREA INFORMATION

Under this heading the study area should be defined and described. Pertinent data on area development, characteristics and population (both present and projected) can be given here. If there are a number of component governmental units contained within the total study area, these should be described, with particular reference to health or health-related functions conducted by each unit.

ECONOMIC BACKGROUND

This optional section may be of considerable importance in some areas but less useful in others. If any recommendations call for large capital expenditures, enough economic data should be included to show that such recommendations are reasonable in view of fiscal capacity. Such items as tax rates, present indebtedness, debt limitations and capital budget data may be pertinent, depending on the recommendations in the report.

COMMUNITY SERVICES

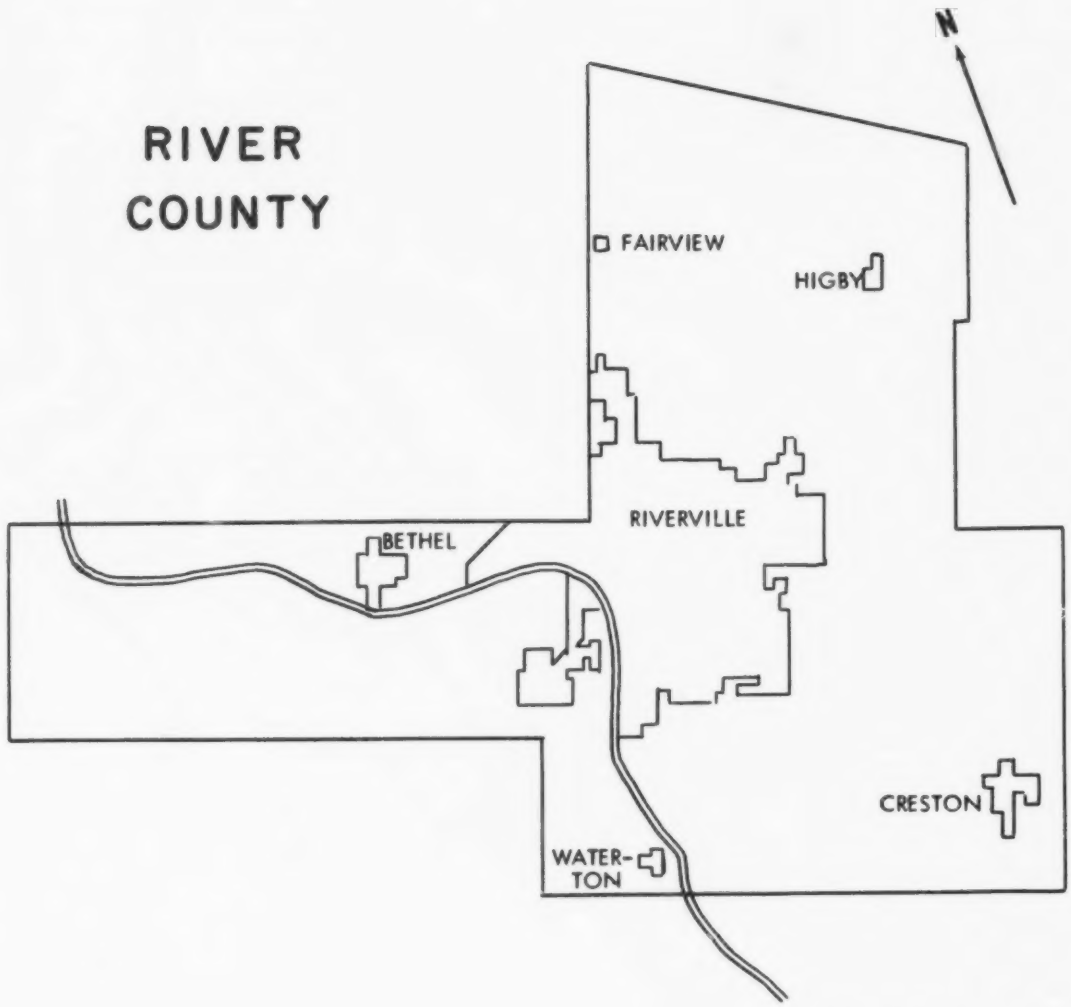
Under each of the following headings, the nature and extent of current community programs should be listed. The ability of current activity levels to meet both present and future needs should be explained, and current or projected areas of need should be described and conclusions and recommendations should be given.

A. Health Agency Operations
B. Planning Agency Operations
C. Air Pollution Control
D. Housing Programs
E. Radiological Health
F. Refuse Collection and Disposal
G. Sanitation Programs
H. Sewerage Services
I. Water Supply Services

IMPLEMENTATION PROGRAM

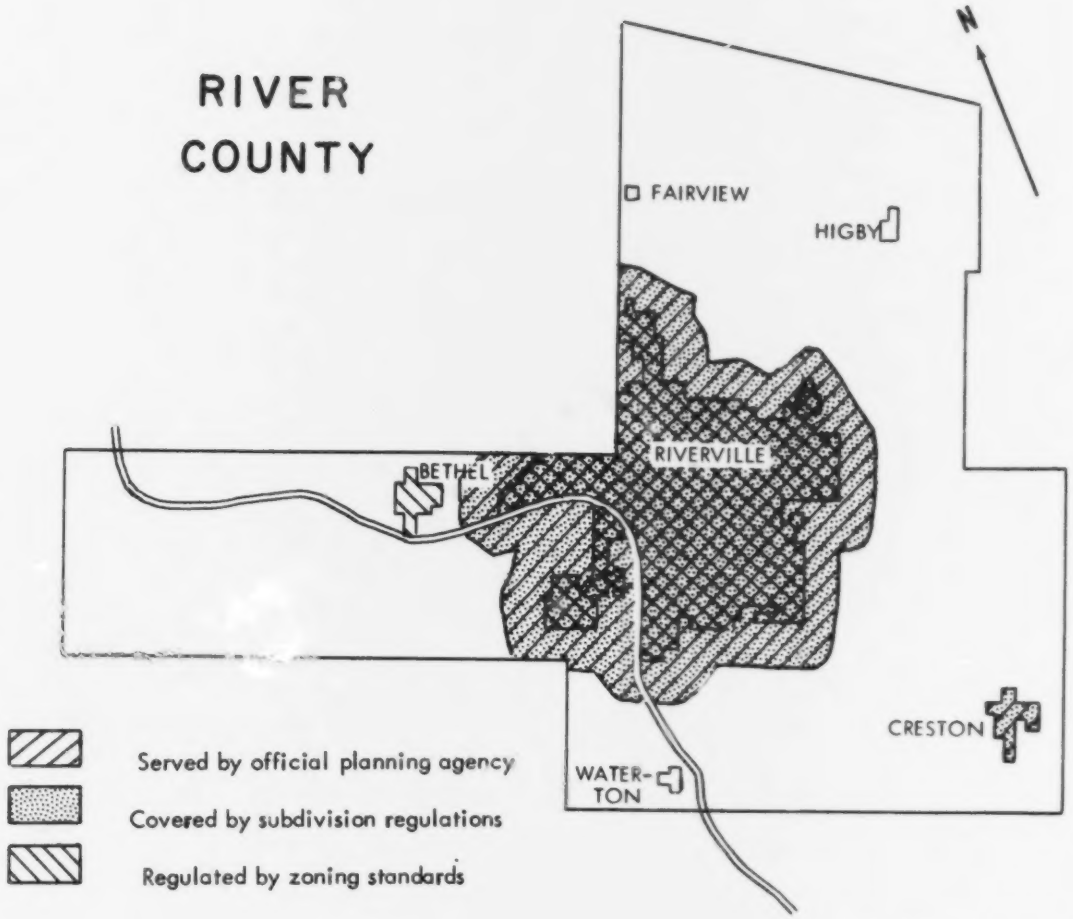
This section should describe plans for carrying out the recommendations. They may include such methods as public discussion as a prelude to elections (bond issues), hearings or petitions bringing needs to the attention of government officials, detailed and intensive studies of particular facets, plans for periodic up-dating of plans, or others appropriate to the particular community needs and situation.

AREA MAP



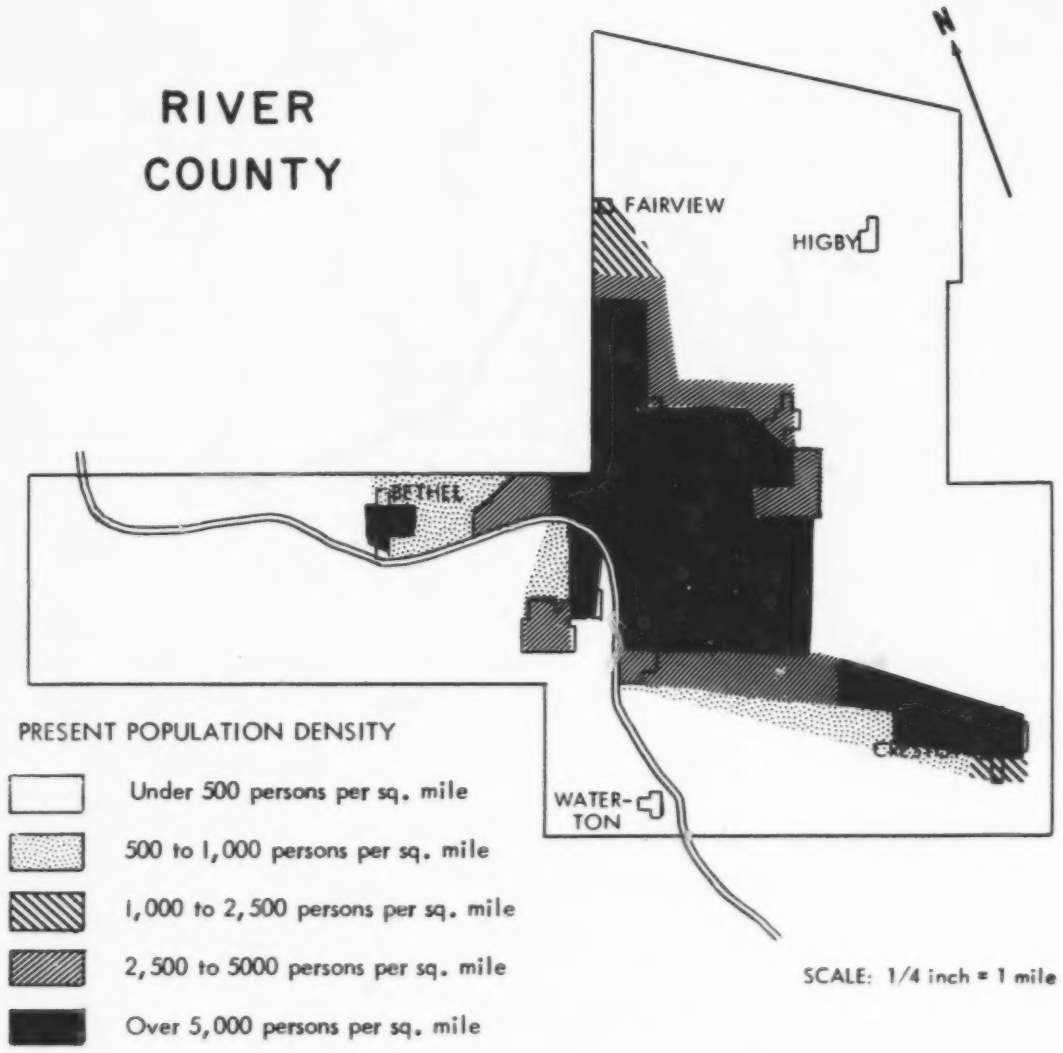
SCALE: 1/4 inch = 1 mile

PLANNING OPERATIONS MAP

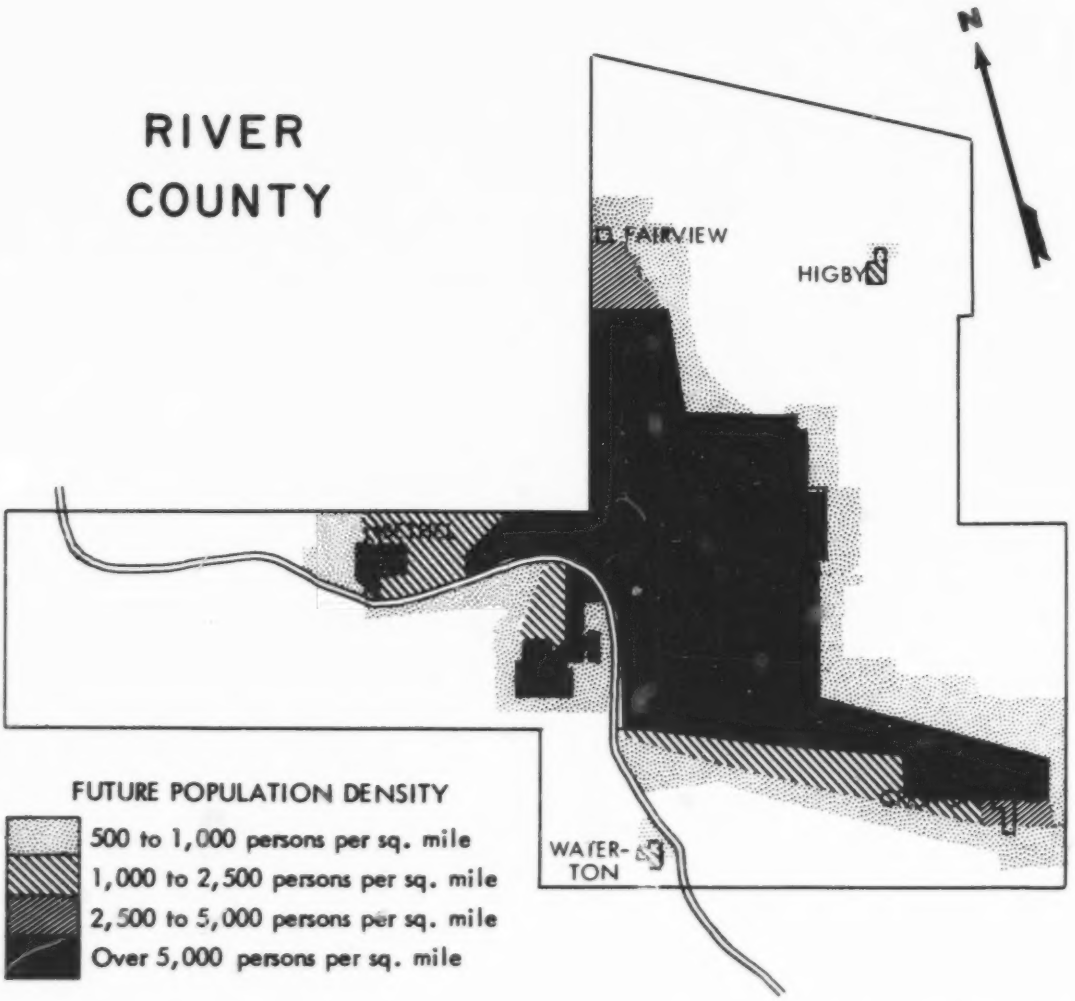


SCALE: 1/4 inch = 1 mile

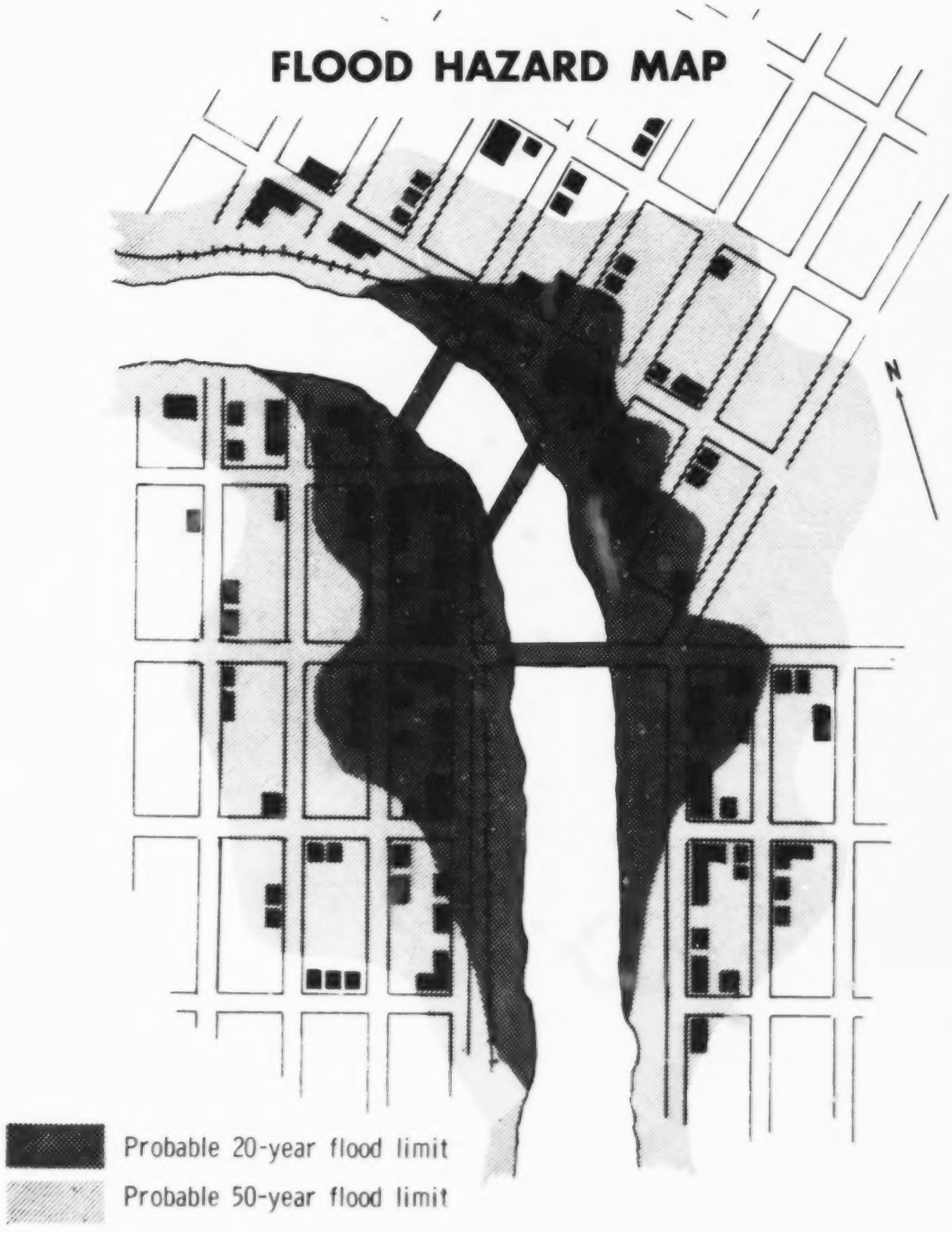
PRESENT POPULATION DENSITY MAP



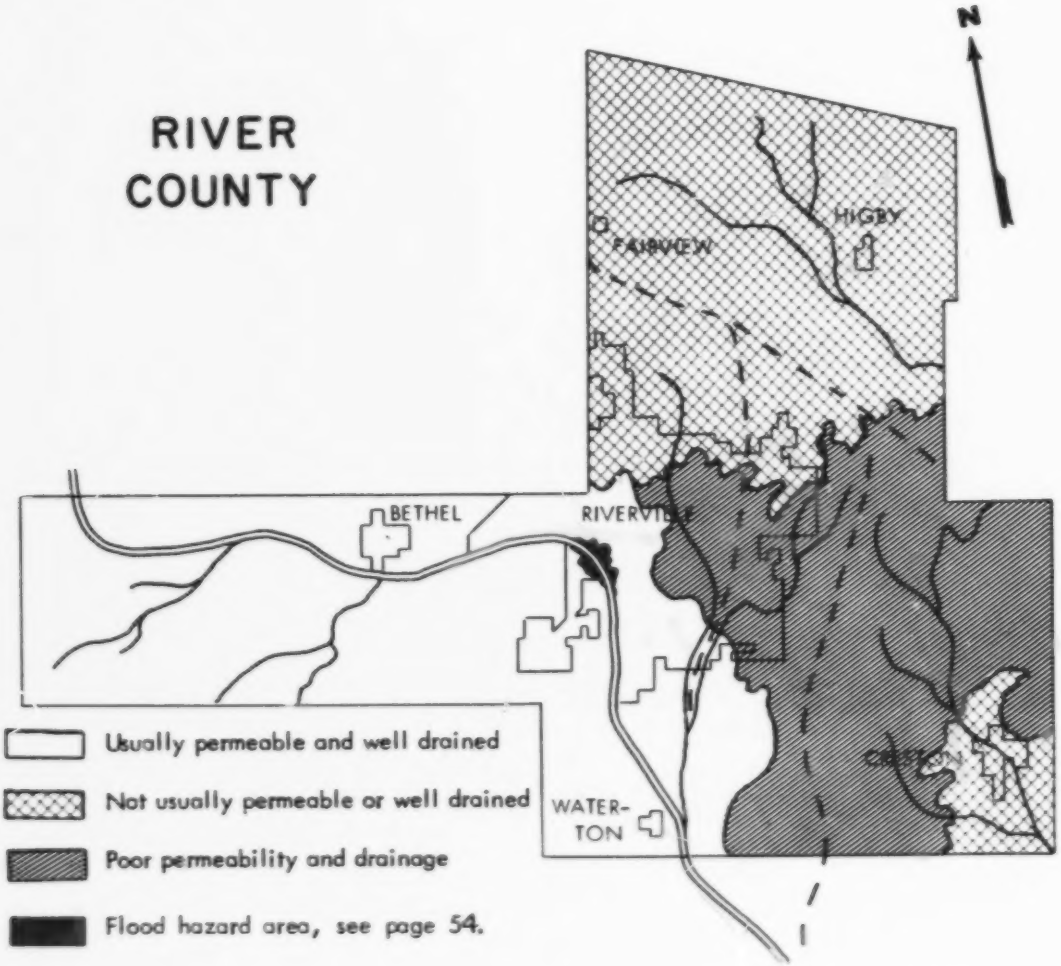
FUTURE POPULATION DENSITY MAP



SCALE: 1/4 inch = 1 mile

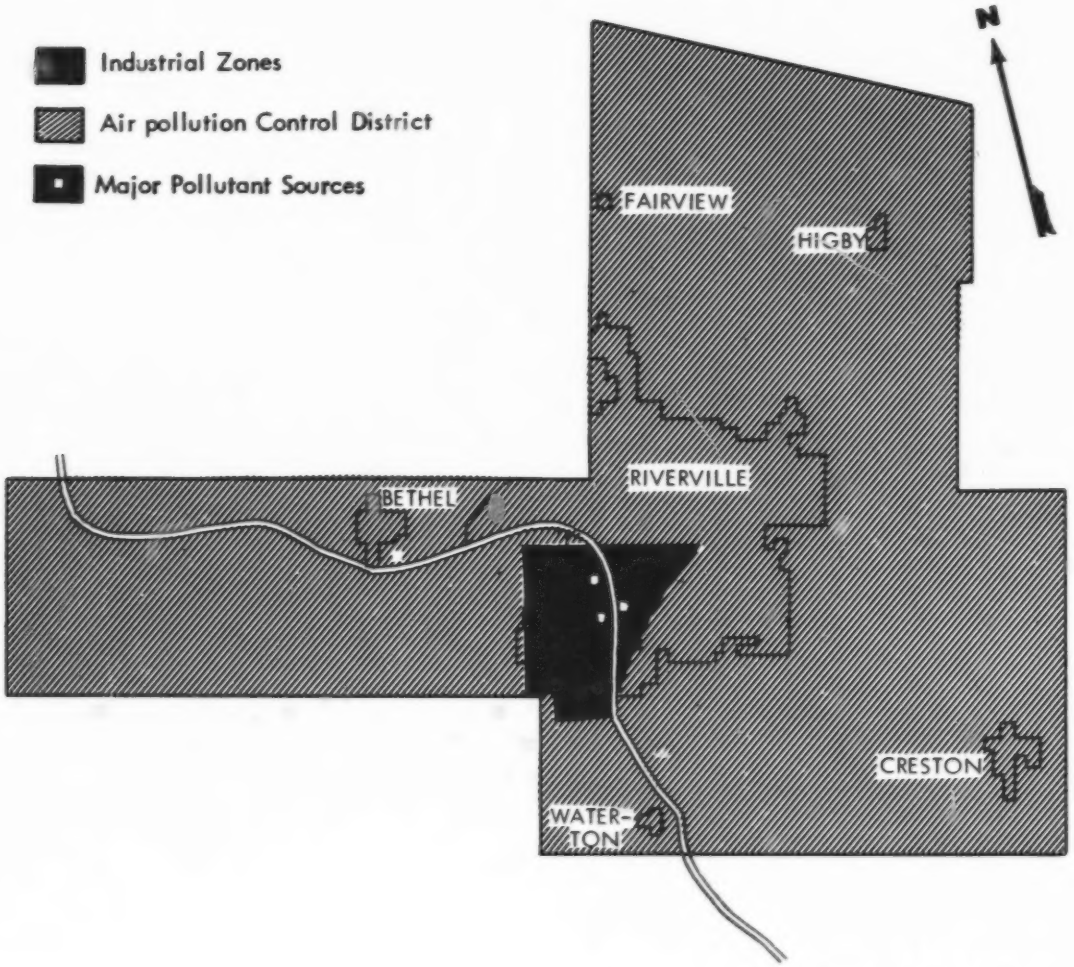

FLOOD HAZARD MAP
N
Probable 20-year flood limit
Probable 50-year flood limit

DRAINAGE AND SOIL MAP



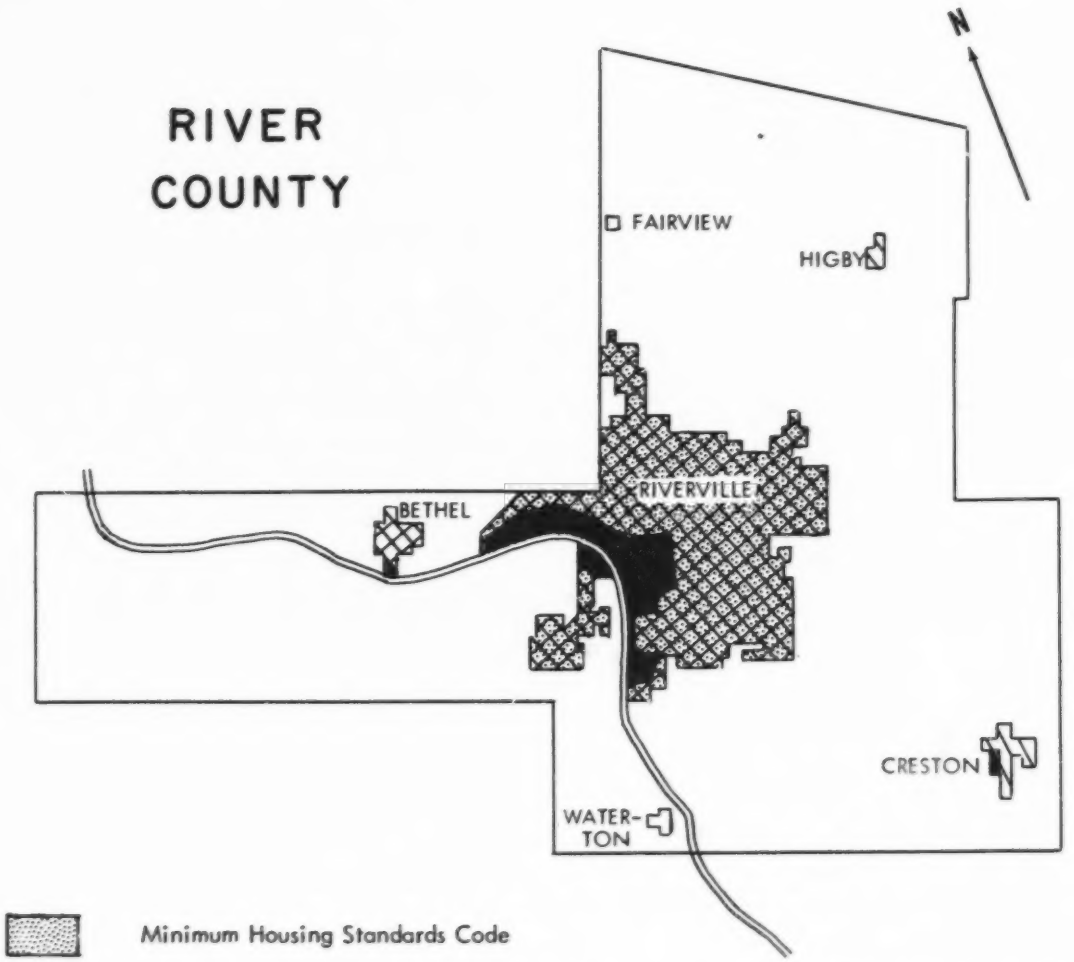
SCALE: 1/4 inch = 1 Mile

AIR POLLUTION MAP



SCALE: 1/4 inch = 1 mile

HOUSING MAP



Minimum Housing Standards Code

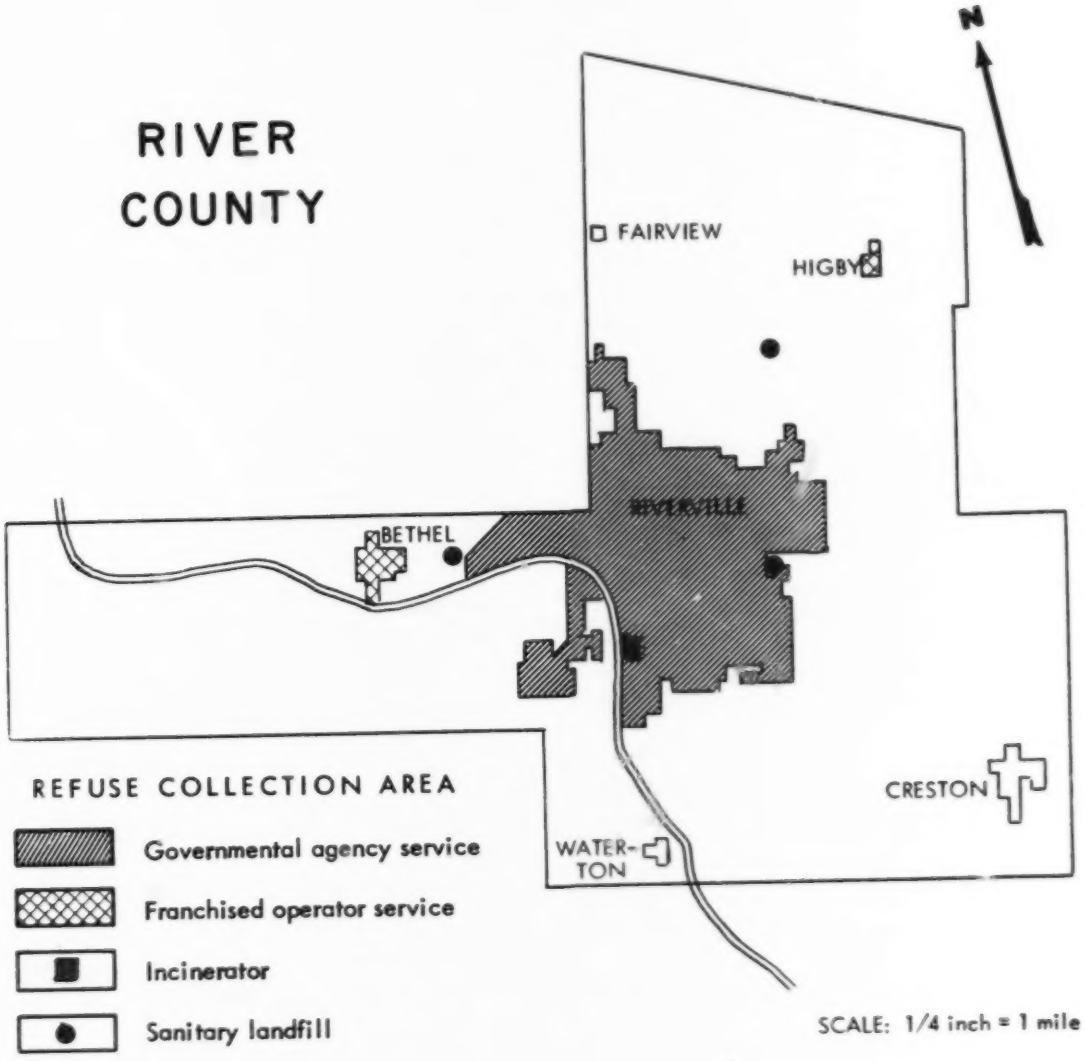
Building, Plumbing, and Electrical Code

Zoning Regulations

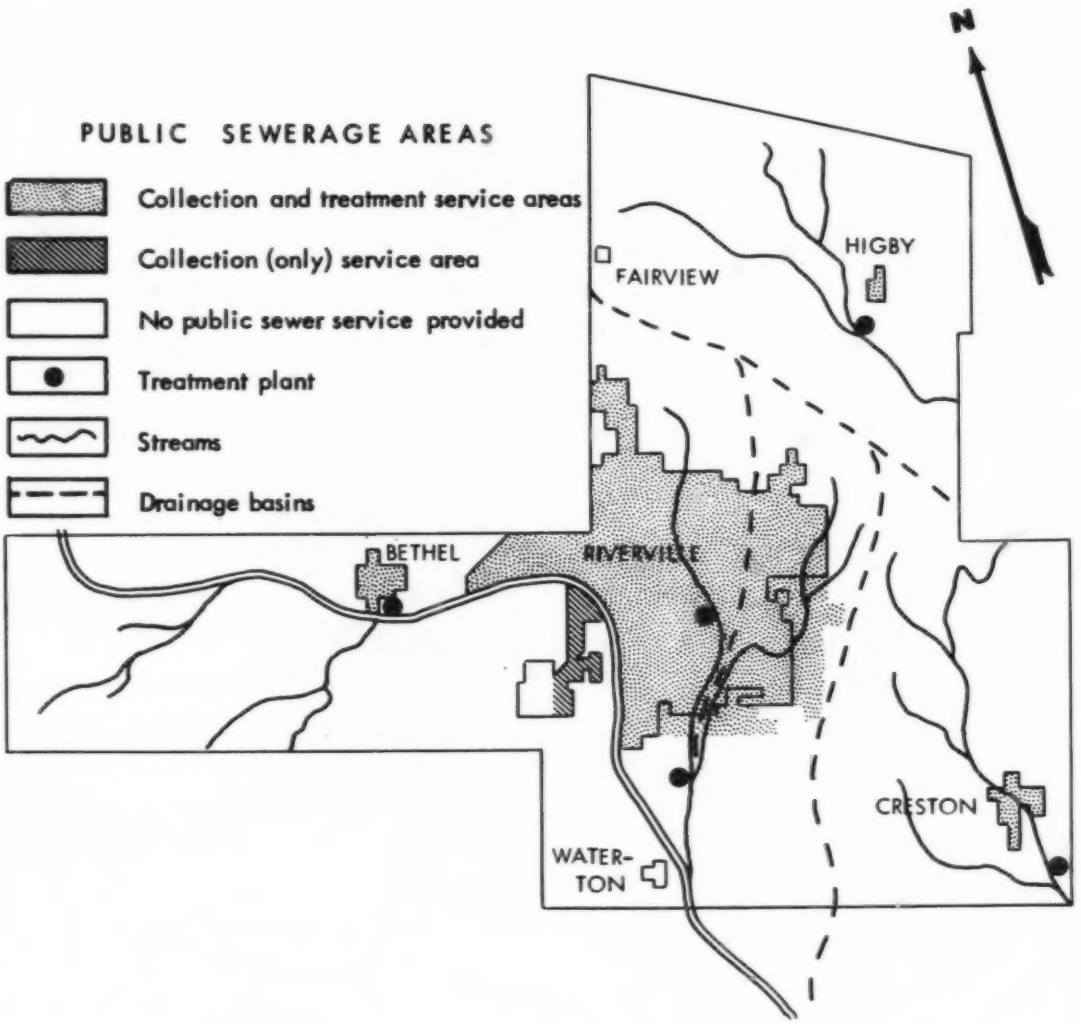
Substandard Housing

SCALE: 1/4 inch = 1 mile

REFUSE MAP

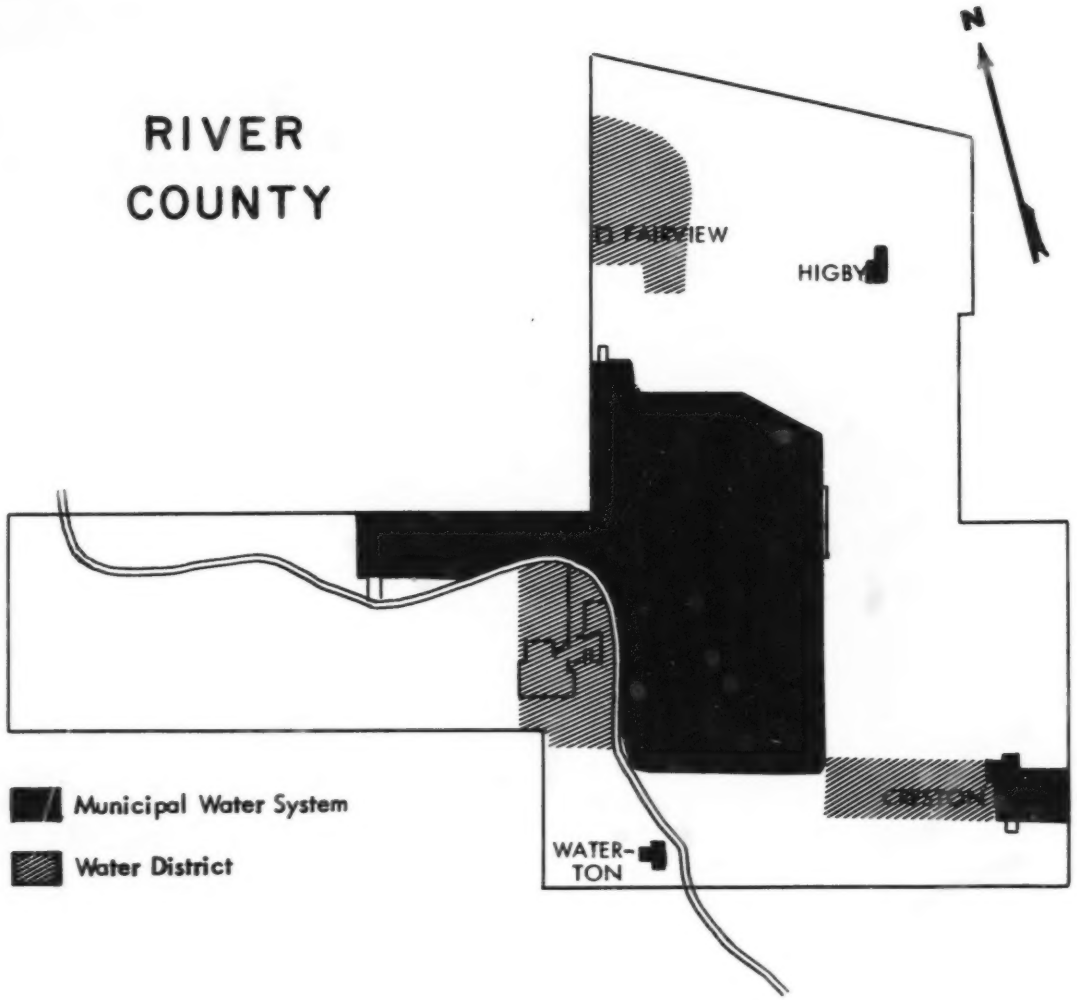

RIVER
COUNTY
N
FAIRVIEW
HIGBY
RIVERVILLE
BETHEL
CRESTON
WATER-
TON
REFUSE COLLECTION AREA
Governmental agency service
Franchised operator service
Incinerator
Sanitary landfill
SCALE: 1/4 inch = 1 mile

SEWER SERVICE MAP



SCALE: 1/4 inch = 1 Mile

WATER SERVICE MAP



SCALE: 1/4 inch = 1 mile

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